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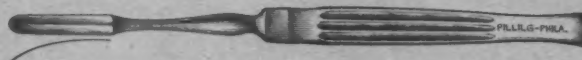
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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding
that they are contributed exclusively to THE LARYNGOSCOPE.)

THE NONSURGICAL DRY TREATMENT OF CHRONIC SUPPURATIVE OTITIS WITH IODIN POWDER (SULZBERGER).*

DR. M. D. LEDERMAN, New York.

For the past fourteen years my experience with the dry treatment of chronic suppurative otitis and some of its complications has been so satisfactory, and at times so astounding, that a few of the case histories and results may prove of interest to those seeking a simple and effective method. While radical surgery has its place in distinct phases of this disease, we should give deliberate and conscientious consideration to the importance of the economic question for those suffering from suppurative involvement of the middle ear, and must attempt to conserve as much auditory function as the conditions permit.

It has been my good fortune to preserve the hearing in numerous instances of prolonged chronicity by employing this method of treatment in cases where radical surgery had been advised by others. A few of these may here be mentioned briefly, fuller details being given later.

A young woman, age 21 years, had a modified radical mastoid operation performed on the right ear at the age of four, following a simple mastoidectomy at the age of 1½ years; the second operation was supposedly indicated for a chronic suppuration due to

*Read before the Otological Section, New York Academy of Medicine, Oct. 11, 1929. (These observations are the results obtained with the original formula of Dr. Sulzberger's iodine powder.)

Read at the American L., R. & O. Society, Atlantic City, May 28, 1930.

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scarlet fever. In this instance the voice and acoumeter in the operated ear were negative. The patient was referred to me by one of our prominent colleagues with the earnest request to save her if possible from radical surgery on the left ear, which was also chronically diseased. The hearing in this ear was 10 feet for the whispered voice. It was feared that if radical measures were instituted this young woman, who was about to be married, would possibly become more deaf and so be handicapped as a useful member of society. It required about six months to obtain a dry ear, as considerable pathology existed. The symptomatology was interesting and dubious.

Another case, that of Dr. L. J., was referred to me by the same aurist. Three colleagues had advised radical surgery for a chronically infected middle ear, extending over 35 years. One of these aurists, without testing the hearing function or ascertaining the pathological condition of the ear, but merely on the strength of the long duration of the ailment, promptly advised the major operation. With this individual, before treatment was instituted, the whispered voice could be heard at 3 feet and the ordinary tones at 10 feet. On my initial examination, a polyp was observed in the attic of the middle ear, which had evidently existed for a long time, and accounted for some of the intermittent symptoms related by the patient. None of the aurists had mentioned the presence of this growth; it probably had escaped notice as it appeared in the field only after gentle suction was applied. The symptomatology in this individual was interesting and will be given later. It required $2\frac{1}{2}$ months of regular treatment to stop the suppuration in this case, and the hearing improved to 14 feet for the whispered voice.

Another case may here be mentioned by way of illustration to emphasize the importance of examining both ears in every instance.

Mrs. B. J., age 52 years, was referred to me by another aurist, attention being directed to the left ear for a peculiar flapping sensation of which the patient complained. Examination revealed a small slit-like perforation of the membrane at the anteroinferior quadrant, but no suppuration was present. She complained of vertiginous symptoms, which some of her former physicians had ascribed to her menopause. She also showed some weakness of the facial muscles on the right side. On attempting to examine the right ear, the patient objected most emphatically. I informed her that it was my routine to examine both ears, but it was only after being advised that it would be impossible for me to give an opinion unless both ears were seen that she permitted examination of the supposedly quiescent ear. She then stated that the right ear had also been chronically diseased for a long time but that it had remained dry

for a year or more and it required no attention. On removing a large crust which covered a perforation of the drum, involving the lower half, a cholesteatoma was found eroding the inner third of the external canal and extending into the middle ear and mastoid cells, with some secretion under this accumulated mass; this caused pressure on the horizontal semicircular canal and facial aqueduct. It required considerable persuasion on my part to induce her to permit treatment of this ear, and it was only after my refusal to take charge of the case unless my suggestions were carried out, and the emphatic opinion that the vertigo was due to the etiology present in this seemingly quiescent ear, plus the urging of her son to permit my treatment, that she consented to such intervention. After two months of biweekly treatments, the ear became dry and the vertigo gradually subsided.

Another unusual and remarkable instance of focal infection giving rise to serious neurological symptoms was the case of a girl, age 15 years, under treatment for epileptiform attacks. Her family physician, while making a physical examination, found a chronically diseased ear. At the time the child was under the care and treatment of a prominent neurologist. In this instance the prompt and truly astonishing results obtained in six weeks, emphasize the necessity and importance of seeking contributory factors in this and other serious ailments.

In the series of cases here reported, no attempt at bacteriological study was made, as the majority of these patients suffered from discharging ears for many years without fulminating symptoms. Frequently, individuals referred to me for an opinion as to the necessity of radical surgery have been cured by this simple treatment. Similar results from this dry method have been obtained by a number of my colleagues who have carried out the technique described, and have become as enthusiastic as myself in regard to the prompt and effective action of the powder and the simplicity of its application.

Since employing this preparation, I have not been obliged to resort to radical surgery in any case lacking active indicative symptoms, no matter how chronic the disease may have been. My experience with the iodine powder convinces me that the indications for such intervention must be distinct and urgent before resorting to such a drastic measure, with its attendant possibility of great loss in auditory function. The following suggestions and technique are offered in the hope that others may derive as much satisfaction and success as it has been my good fortune to experience.

First: Irrigations to cleanse the ear are forbidden. In contemplating the irritation and the maceration of the epithelial tissue in the auditory canal and middle ear, consequent upon daily douching over a period of years, in these chronically discharging ears, one must realize the lowering of tissue resistance that such moisture produces.

Second, and most important, the canal and middle ear cavity must be cleansed as thoroughly as possible. This is best accomplished by repeatedly using small applicators armed with cotton—not simply removing the secretions in the canal or at the perforation. It means the employment of curved applicators to enter the perforation and the attempt to reach the attic, hypotympanic space, and Eustachian orifice in the middle ear. Needless to state, any pathological tissue must be eliminated—granulations of sufficient size and diseased ossicles, if visibly involved. I have seen papillary hypertrophy of the middle ear mucous membrane subside under the iodine powder used in increasing strengths. The larger the perforation of the drum, the more rapid the action of the powder, since a greater quantity can be introduced into the middle ear. When the perforation is small, it should be enlarged so that the powder can reach the diseased area. At times, gentle suction is employed to remove secretion from the middle ear by means of a small glass or metal cannula. Discretion must be employed in using this method, as some patients readily show disturbance of the vestibular labyrinth if too strong suction is applied. One should never attempt suction by using any instrument which completely closes the external canal. Such heroic methods may cause very annoying symptoms, or even hemorrhage in the labyrinth and middle ear. After all secretion has been removed, the canal and middle ear are cleansed with alcohol (95 per cent) and then dried. The thorough cleansing of the canal and middle ear is a very important factor in the ultimate success of the treatment in these chronically diseased ears. Many of my cases required much time and patience before the middle ear was in a proper condition to receive the application of the iodine powder, but the ultimate result fully rewarded faithful attention to this necessary detail.

The final procedure is to insufflate the iodine powder into the middle ear through the perforation. This can best be accomplished by using a Davidson hard rubber insufflator with a shovel arrangement on the distal section. The insufflators in the stores have a curved extremity; this curved portion should be cut off and the end sandpapered in order to remove the rough edges. The straight end should not be over 3 inches long, to give complete control of the

instrument when pressing upon the rubber ball. The colored DeVilbiss powder bottle may also be used, but one must not employ too much air pressure, or most of the powder will be forced out of the middle ear and canal. For initial treatments a 0.75 per cent iodine powder (Sulzberger) is used. The applications are given regularly, depending upon the quantity of the secretion present at successive visits. I have at times found it necessary to give daily treatments when the secretion was profuse; but as it subsided, the treatments were given on alternate days. The majority of my patients received two treatments a week, always depending upon the amount of secretion present at the next visit. No home treatment is allowed except when the patients live out of town or cannot appear regularly. Then a teaspoonful of the powder to 1 ounce of alcohol is prescribed. The individual is instructed to cleanse the canal and remove as much of the secretion as possible with cotton-tipped toothpicks, and then to instill 10 drops of this solution into the canal, with the diseased side of the head uppermost. This position should be maintained for 15 minutes. Dr. Beck prescribes a glass tube with rubber ball attached for use in this home treatment. The powder is gently forced into the glass tube by pressure, and then blown into the ear by compressing the rubber bulb. We realize that the diseased areas are not properly cleansed with such procedure, but it assists in getting some of the medication to the diseased part, and it prevents the patient from using irrigations. When the secretion remains about the same quantity after a number of treatments have been given, a stronger iodine powder (2 per cent) is used. Frequently this may be employed without local anesthetic, but some individuals are sensitive and complain of a smarting or burning sensation. In such cases a weak cocaine solution should be applied to the middle ear before the powder is introduced. In very chronic cases I have used as high as 5 and 10 per cent iodine powder, without unpleasant reaction. Some skins are very sensitive and frequent application of the powder may give rise to a local dermatitis, but this has been rare in my experience. To avoid possible discomfort, any bland ointment—boric acid, lanolin, white vaselin or cresatin ointment—may be lightly painted on the floor of the canal before the powder is introduced.

The query naturally arises: To what virtue of this iodine powder (Sulzberger) can one attribute its activity and the results obtained in these cases of prolonged chronicity?

The preparation is an intimate association of iodine with boric acid, the same being prepared by mixing an iodine solution of desired

strength with dry, finely powdered boric acid and evaporating the solvent. When carefully and properly done, this results in an impalpable powder of boric acid finely impregnated with the desired amount of iodine. The action of the powder is due to the iodine, which as the boric acid dissolves in the secretions is liberated in a most minute division and then spreads over and penetrates deeply into the tissues. Furthermore, owing to the solubility of its boric acid content in the secretions, there is no danger of retarded drainage, as in the case with many iodine powders. This is a most desirable quality. A prompt osmosis occurs, which permits the iodine vapor to reach areas which instrumentation never touches. Hence we have an active germicide which exerts its power as long as there is any powder remaining in the diseased cavity. This powder does not cake, but is completely dissolved within 48 hours, depending on the quantity of the secretion present in the infected ear. Therefore, one need not worry about retarded drainage—surely a very valuable asset of this effective remedy. To me, its activity has been a revelation, and with the consent of some of my colleagues who have tested it, I will quote a few of their experiences.

Dr. M. A. Goldstein, of St. Louis, writes (July 12, 1929): "I am glad to know that the iodine powder is to be marketed and am quite enthusiastic about the value of it. We are using it in the office and in the dispensary of the Jewish Hospital, and all of the men who have really been initiated into its use are quite mystified at its unusual therapeutic results."

At my suggestion, Dr. M. J. Mandelbaum wrote (Nov. 16, 1929) to Dr. Ira Frank, of Chicago, relative to his use of iodine powder in chronic suppuration, as he had been employing it for a number of years. Dr. Frank replied, under date of Nov. 14, 1927: "I have been using the iodine powder in my chronic suppurative otitis medias for the past four or five years, and I must confess I have had unusual success. I have seen granulations disappear, suppurations cease, and fair-sized perforations close. We are doing fewer radicals each year. Recently I have tried it on subacute suppurative otitis media with the same good results. I feel that it has become one of my most valuable aids in suppurative conditions of the ear, either subacute or chronic. I have always felt deeply indebted to Dr. Lederman for calling it to my attention."

On May 17, 1929, Dr. Frank wrote to me: "I am still getting uniformly good results with the powder in my ear cases. Please write me more in detail how you are using it in nasal conditions, and in what class of cases."

At the last meeting of the Trilogical Society in San Francisco, July, 1929, Dr. J. M. Beck*, of Chicago, read a paper on "The Nonsurgical Treatment of Chronic Middle Ear Suppuration", based on 25 years of experience. He sent me an advance copy, from which I quote several statements:

"Surely we are all agreed that even if a radical mastoid operation is well performed, in many instances much remains to be desired in obtaining a cessation of the discharge and a conservation of the hearing. . . .

"I am not able to give any statistical report from my own experience nor from the literature, but I will make this general statement: that I have yet to see one case of chronic suppuration of the middle ear that I treated and continued to observe that developed any of the serious intracranial complications. Furthermore, I have not seen any serious general disease—such as rheumatism, cardiovascular or renal disease—from absorption or metastasis—that is to say, a chronic septic focus. Of course we do not believe in having our patients go about with a chronic suppuration of the middle ear, especially if associated with or suspected of necrosis; yet that oft-repeated remark that the ear had better have an operation because one can never know when it may explode, does not hold good so far as my own observation goes. There are always present signs and symptoms in plenty of time to warn one and place the indication for the operation. . . .

"On a recent visit of Dr. Lederman, of New York, to Chicago, he directed my attention to a preparation of boric acid powder which contains iodine. His experience with this type of treatment of chronic suppuration of the middle ear, which had extended over a period of years, was so flattering that I undertook to treat a series of more than 30 cases in private practice. I realize, of course, that this is a small number, but I have found that his statements are absolutely correct as to the value of drying up most of these ears. Again, I repeat that it is too early to judge as to the permanency of this cure." . . .

His conclusions are:

"1. That chronic suppuration of the middle ear when labyrinthine irritation, severe headaches and pains, or facial involvement, are absent should be treated persistently before an operation on the mastoid is recommended.

"2. That suction properly carried out by means of a small cannula, in contra-distinction to the objectionable method of mass suction by obstructing the external auditory canal, is of great value.

*Annals of Otology, Rhinology and Laryngology, December, 1929.

"3. That remedies containing iodoform have a very beneficial action on the chronic suppuration process, especially the iodized boric acid powder.

"4. That water, introduced by way of the external auditory meatus, is most harmful to the chronically discharging ears.

"5. That all contributory pathology—whether local, as granulations and polypi, nasal and pharyngeal disease—as well as all the general conditions, shall have the necessary attention."

Some of the cases whose histories are here presented had previous radical surgery performed, with less satisfactory results than have been obtained by this simple method. Instances of cholesteatoma have responded to its curative action. It has proven to be the most effective treatment I have employed in 40 years of aural practice. It avoids the distress and anxiety of a serious operation, plus a long convalescence, while at the same time preserving a useful amount of auditory function, which, after all, is the *sine qua non* of any treatment, be it medical or surgical.

CASE HISTORIES.

Case 1: M. M., a woman, age 21 years, was referred to me by one of our prominent aurists for a chronic otitis media of the left ear, from which she had suffered for the past five years. The right ear had had two mastoid operations for chronic suppuration due to scarlet fever, the second being a modified radical one. Following this surgical treatment, the patient's hearing was lowered so that the ordinary voice could not be heard with the Barany apparatus in the left ear, nor with the acoumeter. The hearing distance in the left ear was 10 feet for the whispered voice and 7 feet for the acoumeter. She was sent to me with the hope that the suppurative process might be arrested and useful auditory function preserved without serious surgical intervention. The secretion from the left ear was odorous, and there was a history of bloody discharge at times; vertigo was a pronounced symptom and the patient was usually attended by a companion for fear of an attack. For the two months previous to her first visit she had been dizzy daily, off and on; this symptom was markedly increased on douching the ear.

On examination, a large perforation was seen occupying the posterior third of the drum, with debris and a granuloma in the attic region posteriorly. No nystagmus was observed. Some cholesteatomatous tissue was removed from the middle ear cavity. After thoroughly cleansing the middle ear according to the technique I have described, the granulation tissue in the attic was removed under local anesthesia, and after the cessation of the oozing a 2 per cent

iodin was insufflated, the middle ear cavity being filled. Similar treatments were carried out daily for 10 days, until the discharge lessened, after which the treatments were continued on alternate days. During this period granulations were removed a number of times, whenever they seemed of sufficient size to demand it. All home treatment was prohibited excepting that the cotton in the canal could be removed when saturated and fresh cotton applied after cleansing the orifice with alcohol. This was done to prevent the local infection of the hair follicles, which so often occurs in these cases. It required seven months of this careful treatment before the ear became dry, at which time the vertiginous symptoms had all disappeared, and the hearing had improved to 15 feet for the whispered voice.

At the outset the prognosis for this patient was poor and it seemed doubtful if an operation could be avoided, but the results obtained led me to feel that similar conditions should be given the opportunity of this treatment before surgical intervention is advised. This belief has been strengthened by a number of other cases whose histories will be given briefly.

Case 2: Dr. L. J., a dentist, age 42 years, was referred to me by the same aurist just mentioned, for a chronic suppurative otitis of the right ear of over 35 years' duration. He had been seen by three prominent aurists, all of whom advised radical surgery. The doctor who was kind enough to refer him to me suggested that the dry treatment might avert such intervention, as the hearing of the ordinary voice was 10 feet, and for the whispered voice, 3 feet, and on account of the patient's profession it was important to save as much auditory function as possible. The disease had followed measles. The secretion was odorous and of an intermittent type; pain on the top of the head was one of the symptoms complained of. Occasionally the ear bled and this pain was relieved. The fistula test was negative. The hearing was fair in the right ear with the Barany apparatus in the other. The X-ray showed no disintegration of the mastoid cells. The patient had suffered from attacks of vertigo, and examination revealed a large perforation of the posterior half of the drum, including Schrapnell's membrane; there was considerable secretion in the middle ear, and the patient had for many years been accustomed to cleanse the ear twice a day by douching.

Gentle suction by means of the cannula was applied, which brought into view a polyp occupying the posterior attic space; this accounted for the intermittent symptoms. The patient was of a nervous temperament, but when I offered the hope that we might be able to

avoid a serious operation if the local lesion was eliminated, he promptly accepted my views and permitted me to remove the pathological tissue; it came away easily and proved to be the size of a small coffee bean. The customary technique was carried out daily for 10 days or two weeks, after which the interval between treatments was lengthened; some granulations were removed from time to time before the final cessation of the secretion, but in two months the ear was dry for the first time since childhood. It was also surprising to see the perforation grow smaller. At the last visit of this patient the whispered voice could be heard at 12 feet.

Case 3: Mrs. B. J., age 52 years, was referred by an aurist who was leaving on his vacation. She gave a history of chronic suppuration since childhood, with dizziness at times, which symptom was increased on douching the ear. There was marked deafness in the right ear and a slight weakness of the facial muscles on the right side, which had existed for a long time. She complained of a "shaky" feeling in her legs. There was no nystagmus. Attention was directed by her aurist to a flapping sensation in the left ear, which caused her much annoyance. No mention was made of any involvement of the right ear.

Examination revealed a small perforation of the anteroinferior quadrant on the left side with a slight amount of mucoid secretion, but the appearance of this ear did not suggest sufficient pathology to account for the symptomatology. On attempting to examine the right ear the patient objected seriously (as already mentioned), but finally consented, as an opinion was otherwise refused, and the following conditions were observed: A large crust covered the posterior portion of the canal and membrana, on removal of which a very large perforation of the drum was seen, with complete destruction of the inner aspect of the external auditory canal; the malleus and incus had disappeared; there was a large cavity leading into the mastoid cells, which was filled with cholesteatomatous masses causing pressure on the horizontal semicircular canal; a large furuncle on the right floor of the nose was also observed; this was incised and the core removed.

The middle ear and cavity were cleansed with a dull curette as far as possible at this sitting, after which the cavity was filled with a 0.75 per cent iodine powder, and the patient was instructed to leave the ear alone, excepting to change the cotton when saturated. Treatments were carried out three times a week for a while, and then at longer intervals. The middle ear and mastoid area soon became cleaner, but at each visit considerable attention was needed before

the powder could be applied. In a little over two months the ear was dry. The hearing in the right ear with the noise apparatus in the other was negative, with no active labyrinthine infection present, although during the course of treatment she had at times complained of distinct vestibular reactions. Her vertiginous symptoms were decidedly improved and she was able to go about alone, whereas before she feared to venture out without a companion.

Case 4: L. R., a woman, age 27 years, gave a history of chronic suppuration for 17 years. At one of our ear hospitals in New York she was advised to have a radical mastoid operation, but this was refused because of the death of a friend after operation for a similar condition. Examination showed a large myxofibroma filling the left auditory canal, surrounded by mucopurulent secretion. The patient was informed of the possible reaction following the removal of so large a growth and the possibility of extension of the infection, but consented for this to be done. The removal of the mass required two sittings on account of the patient's neurotic condition; but after this was accomplished a large perforation of the upper posterior superior quadrant was visible, through which the growth had appeared.

Eight weeks of treatment with a 0.75 per cent iodine powder resulted in a dry ear, with no sequelae, with useful hearing function.

Case 5 (This is the case with epileptiform attacks, already mentioned): Miss A. S., age 15 years, gave a history of chronic suppurative ear since childhood; she had had measles, but the ear was discharging before that infection. The discharge was odorous and the hearing was defective. The tonsils and adenoids had been removed by two operations. Prior to my examination, the patient was under the care of an eminent neurologist for epileptiform attacks. Dr. J. B. Cohen, the family physician, discovered the ear condition during a general physical examination, suggested to the parents the possibility of some etiological association with the epileptic attacks, and referred the girl to me.

The patient was a healthy, strong looking girl, above the average height, but had had these epileptiform attacks for some time, the aura being referred to the region of the stomach. The hearing in the diseased ear was 12 feet for the ordinary voice, 7 feet for the whispered voice and 4 feet for the audiometer. There was considerable secretion in the canal of the ear and a large perforation of the drum, involving the lower half, with granuloma in the region of the promontory. The usual technique was carried out. The granuloma was cauterized with trichloroacetic acid, since it was in-

advisable to use local surgery on account of the activity of the neurological symptoms. Treatment with 0.75 per cent iodine powder was carried out three times a week for eight weeks, after which the ear was perfectly dry—since when, now two years ago, the young lady has had no epileptiform attacks.

Case 6: S. B., a girl, age 14 years, at six years of age had a severe pneumonia, complicated by endocarditis. The left ear became infected and ruptured spontaneously. Symptoms of mastoiditis appeared, but owing to the complication mentioned, operative intervention was not attempted by the attending aurist, as the child was desperately ill. Eight years later she was referred to me for treatment, with the request that surgical treatment be avoided if possible. The ear had been suppurating all that time, and examination disclosed the following conditions:

A fistula, the size of the small finger tip, opened into the mastoid process an inch from the external auditory orifice. The mastoid cavity was filled with cholesteatomatous debris, granulations and purulent secretion; the external canal contained considerable purulent secretion.

The hearing for the ordinary voice was 4 feet; for the whispered voice, negative. The watch could be heard at 3 feet. The drum showed three perforations, and the middle ear contained purulent secretion.

Here was an instance where even conservative judgment would promptly and justifiably advise radical surgery, but the family emphatically objected to any such procedure as the cardiac ailment was causing the girl much suffering. In the face of this unpleasant situation and with the serious nature of the condition described to the family, local treatment was instituted. It is unnecessary to detail here the time, patience and gentleness demanded to cleanse the mastoid cavity of the existing pathology. It required repeated attempts, each sitting lasting from 30 minutes to an hour, before the cavity was sufficiently dry to insufflate the powder. Then both the mastoid and the middle ear cavities were filled with 0.75 per cent iodine powder, all home treatment being prohibited.

A dull ring curette was the instrument employed, preceded by the exploration of the probe to ascertain if any sinus exposure could be detected. I fully appreciated the danger of too heroic manipulation in this region without direct visualization; but it was the only practicable method of preparing the cavity through the existing fistula. The mastoid tip also was reached in the same manner. To curtail this very interesting history, I will simply state that it was

nine months before the ear and mastoid cavity became dry, at which time the hearing had improved 3 feet to the ordinary voice.

There was some return of the cholesteatoma three years later, for which the same treatment was carried out, the ear and mastoid cavity becoming dry in a month. The patient has been observed off and on since 1919, and at the last examination, on Oct. 9, 1929, the middle ear and mastoid cavity were perfectly dry.

Case 7: Miss E. K., age 20 years, gave a history of chronic suppuration in the right ear for 10 years, the ear being always moist. The tonsils and adenoids had been removed in Poland, and some granulation tissue from the ear at the same time. The secretion was odorous. The hearing in the affected ear was much lowered.

Examination showed that nature had performed a modified radical operation, as the posterior half of the drum was gone, as well as the internal portion of the external auditory canal, leaving a large opening into the mastoid cells. This cavity was filled with purulent secretion, granulations and cholesteatomatous debris. The usual technique was followed, a 2 per cent powder being employed.

In a week's time, after three treatments, the odor was much diminished and the cavity became dry in less than a month.

A year later, following an attack of influenza, a large epithelial cast of the cavity was removed, but no moisture was found. Seven months after her influenza, the patient again appeared with a moist ear. She had been bathing all summer without protecting the ear, and the cavity became infected. This condition had existed for two months before treatment was sought. In three weeks the ear again became dry.

Four years later, I again saw the patient as she had become impressed with the importance of having the ear examined from time to time. My notes record some epithelial casts removed; cavity dry, and hearing at 8 feet for the whispered voice.

Case 8: Mrs. S. G., age 34 years, referred by a colleague, who had seen the result of the powder in the case of the dentist already mentioned. She gave a history of chronic suppuration of the left ear for 13 years; the secretion was bloody at times, with odor, but the discharge was not profuse; she noted that granulation tissue came away at times. She caught cold easily. There were no vestibular symptoms. Radical surgery was advised by two prominent aurists.

On examination, the ordinary voice was heard at 2 feet; whisper not heard. Weber test referred to left (diseased) ear. After cleaning the purulent secretion from the fundus, a large papillated red mass was seen, resembling a raspberry in appearance; at first inspec-

tion it looked like a granuloma of considerable size, but on closer observation a small opening was seen in the anterosuperior region, which proved to be a perforation in an unusually hypertrophied and infected membrana tympana. Considerable cholesteatoma was removed with a dull curette through this perforation and 3.75 per cent iodine powder was insufflated through the opening. The entire drum was covered with the powder. The patient had been douching her ear for years, and this procedure was promptly stopped. Debris and granulation tissue was removed from the middle ear from time to time, and the dry treatment continued. In about four weeks, the suppuration had almost ceased and the hypertrophied drum was gradually resuming a more normal aspect. Two months later, the membrana was flat, with a slight amount of mucoid secretion in the middle ear. At that time a 1.75 per cent powder was being used. Hearing 6 feet for ordinary voice with Barany apparatus in the good ear. In seven months the ear was dry, with some reformation of the drum. The patient was not seen again for two years, when she returned on account of a fullness in her ear.

Inspection revealed the perforation filled with cerumen and epithelial debris, resembling cholesteatoma; this was thoroughly cleaned out and a 0.75 per cent iodine powder insufflated. Two treatments weekly brought about a dry ear again in two weeks. Again, the instruction was given to appear from time to time so that any accumulation might be given the necessary attention to prevent erosion of the neighboring tissues. The patient was last seen on Oct. 9, 1929, with a dry ear.

I have seen a similar condition exist in patients following a radical operation without subsequent proper attention. Two such cases are herewith briefly described.

Case 9: A. W., a man, age 23 years, gave a history of chronic suppuration of the right ear for 12 years. About a month before consulting me, he became dizzy and felt nauseated. These symptoms were brought on by a syringing of the right ear and instilling drops into it. Eight years previous to coming to me, he had had a radical mastoid performed at one of our special hospitals.

Local Picture: Considerable purulent secretion in the canal; polyp attached to anterior wall of canal adjoining the middle ear cavity; granulation tissue over the round window and extending into the posterior cavity, which was filled with cholesteatomatous debris. Vertigo was produced by probing the region of the horizontal semicircular canal. The parts were carefully cleansed and a 4 per cent iodine powder liberally insufflated into the large cavity. Slight vertigo was experienced for a few minutes, as a considerable quantity of powder

had to be used to cover the large area. These treatments, together with cauterization of granular areas, were given regularly, and in six weeks the ear was dry. Later on, only a 2 per cent powder was employed. A labyrinthine fistula was present, but as no alarming symptoms arose, the treatments were continued without further annoyance to the patient.

The young man was seen a year later, and some cerumen and epithelial debris was removed, but no suppuration was noted or vertigo experienced.

Case 10: L. F., a man, age 22 years, gave a history of chronic suppuration of the left ear, extending over 20 years, following scarlet fever. A radical mastoid operation had been performed in Newark in 1922, and the symptoms complained of dated from that time, namely: Vertigo at times, aggravated on douching the ear or when stooping with the head low; ear painful in damp weather.

The hearing was fair with the good ear plugged by cotton and finger; air pressure with the handbag caused no labyrinthine disturbance. No active suppuration existed, but four pockets in the operated cavity were filled with cholesteatomatous debris. Considerable cicatricial tissue was present, and a granulating area posteriorly.

Treatment consisted of thorough removal of the accumulated masses and the use of 2 per cent powder. The patient was irregular in his visits but the record shows that the ear was dry in six months, with the vestibular symptoms much improved.

Case 11: M. J. K., a man, age 39 years, gave a history of fullness in the right ear for three years. For the past year he had noticed some moisture and considerable itching in the ear, experienced some difficulty in hearing, and had an annoying local infection in the canal. For two months there had been constant secretion in the canal. A previous X-ray examination showed a sclerotic mastoid. No immediate acute symptoms. He had been treated by another aurist before coming to me for an opinion.

Local Picture: Hearing, 4 feet for ordinary voice; some purulent secretion at fundus; on this being removed, a large granuloma was seen completely covering the membrana.

On being informed that the growth would have to be removed before the powder treatment could be carried out, the patient skeptically inquired whether I was sure it was a growth, as the other aurist had not mentioned its presence. To ease his mind as to any doubt of its existence, the polyp was demonstrated to his family physician, who happened to be present at the examination. Three days later, the growth was removed without much trauma, and two perforations were seen in the tympanic membrane. The middle ear

was cleansed of secretion and debris by means of gentle suction through a small cannula, and a 1.75 per cent iodine powder was insufflated. The polyp was as large as a raspberry. In 10 days the ear was dry.

All these chronic ears should be examined at intervals of a few months, otherwise the perforations, if not completely closed, do become filled with cerumen and epithelial debris accumulations, which if not cleaned will cause pressure absorption.

Case 12: D. G., a well nourished boy, age 5 years, had had suppuration in both ears for over a year, the otitis following an adenectomy and tonsillectomy. Both ears were incised three times, and three days later the patient developed scarlet fever; the ears had been discharging ever since. The child had been treated by four aurists before consulting me, at which time he could hear a loud voice. He was very nervous, owing to previous experiences with ear treatments. His speech was indistinct.

Local Picture: Purulent secretion in canals. Left ear: large polyp coming through perforation in upper posterior quadrant, covering lower portion and filling canal lumen. Right ear: three-quarters of membrane, with malleus and incus, absorbed; granuloma covering promontory; mucous membrane of middle ear soggy and hypertrophied.

Treatment: Under local anesthesia, the polyp was removed from the left ear on the day of the examination; 0.75 of iodine powder was employed in the treatments, and in three weeks the ear became dry. At the end of two months a secondary membrane had formed over the perforation. The right ear required considerably more attention. The hypertrophied mucous membrane was cauterized at various sittings with chromic and trichloroacetic acid, followed immediately by the insufflation of 0.75 per cent powder. This ear became dry only after seven months of treatment.

About a year later, the boy had an attack of measles and the mucous membrane of the middle ear became filled with mucopurulent secretion. The reinfection responded promptly to routine treatment. When the boy was last seen, seven years later, both ears had continued dry and the perforation on the left side had healed over.

Case 13: L. de S., age 15 years, at 5 years of age had had an acute suppurative otitis in both ears, with considerable purulent discharge, which was odorous. Four years before consulting me, a polyp had been removed from her left ear in Naples, and the tonsils and adenoids were removed at about the same time.

On examination, the polyp had recurred in the left ear, almost filling the canal and accompanied by considerable secretion, the odor being marked. Some suppuration was noted in the right ear also, with distinct evidence of attic disease and considerable loss of Schrapnell's membrane, but the lower portion of the membrane was intact. The patient was subject to attacks of acute nasal infection; whenever this occurred, the secretion in the ear was increased and the hearing was lowered. At times the secretion from the left ear was so copious as to moisten her pillow. The large polyp which was attached in the region of the attic of the left ear was removed, and 0.75 per cent iodine powder was insufflated, filling a rather large cavity in the upper part of the middle ear. After six weeks of treatment the left ear was dry and has so remained to date, two years later. The right ear was more resistant to treatment, as the disease seemed to involve the entire attic, but a recent examination shows no moisture in this canal, although on delicate manipulation in the posterior region of the attic the cotton applicator returned slightly moistened. A 2 per cent powder is now being used in this ear, no treatment being required in the other. The hearing for the ordinary voice is markedly improved in both ears. At present, the right ear is also dry.

Case 14: Mrs. M. P., age 35 years, gave a history of chronic suppuration in the left ear since childhood, a matter of over 30 years. There was constant secretion in the ear, her pillow being moistened at night if cotton was not put in the ear, and any excitement increasing the discharge. The hearing was markedly affected. Pus had been found in the urine.

On examination the canal and middle ear were filled with mucopus; the malleus and incus were absorbed; the drum was two-thirds gone; the Eustachian orifice was readily seen. The ordinary voice was heard at $3\frac{1}{2}$ feet, a whisper at 1 foot. In this case, a 2 per cent powder was used three times a week. In two months, the ear was dry and regular treatment was discontinued. A year ago, the hearing had improved to 10 feet for the ordinary voice, and $3\frac{1}{2}$ feet for the whisper. Some six weeks ago, the patient informed me that the ear had remained dry.

Case 15: A. S., a boy, age 15 years (a recent case), has had an irregular discharge from both ears since 2 years of age. The tonsils and adenoids were removed about four years ago; the patient had somewhat improved since this operation. The secretion was odorless. The hearing was about 10 feet for the ordinary voice.

Examination: Two-thirds of the membrana of the left ear were absorbed; a small marginal perforation was also present, antero-

superiorly. Some cholesteatoma was removed. The right ear showed a small central perforation and a lower marginal postero-superior perforation, with granulation presenting on the marginal perforation. Two per cent iodin powder was applied in both ears. The right ear responded promptly to the treatment and was healed within six weeks, with both perforations closed. The left ear became dry in three months. This patient is still under observation; an attempt is being made to close the perforation of the left ear by stimulating the edges, no powder being used at the present time. The hearing distance on Sept. 1 was 14 feet for the right ear, 12 feet for the left ear.

Case 16: Mrs. T. A., age 42 years, nine months before seeing me had had an attack of influenza and bronchopneumonia, complicated by acute otitis with spontaneous rupture of the drum of the left ear. There was some mastoid tenderness at the time, and the patient informed me that she had some labyrinthine irritation, with a horizontal nystagmus. There had been no projectile vomiting, but the patient had been much nauseated and vomited easily. X-ray examination at the time showed some cloudiness of the mastoid cells, but no destruction of the trabeculae. She had had to remain in bed for some time owing to the labyrinthine irritation.

On examination, there was some weakness of the right rectus muscle and complete loss of hearing for the whisper, watch and acoumeter. A loud voice could be heard at about $1\frac{1}{2}$ feet. The entire membrana flaccida was gone, together with the malleus and incus; there was some mucopurulent secretion in the middle ear cavity.

A small quantity of 2 per cent powder was insufflated into the middle ear, followed by 0.75 per cent powder, completely filling the cavity. Within three weeks, ear was much improved, and in six weeks became entirely dry. There was no improvement in the hearing, as no doubt this patient had had labyrinthine involvement from the onset of the disease. All tuning forks (Weber) were referred to the opposite side. The vertigo had improved considerably.

This patient has not been seen for a year; presumably, there has been no return of the secretion.

Case 17: D. G., age 6 years. Ten days before coming under observation, the little one had pushed a wooden applicator into her right ear, followed by considerable bleeding for two or three days.

On examination, symptoms of coryza were noted, with Koplik's spots and a temperature of 103.5° . There was no mastoid tenderness, but there was considerable purulent secretion in the right ear, and the lower part of the drum was missing, due to the trauma.

One-half per cent iodin powder was used in this case, irrigations being prohibited. On the following day, there was less secretion and the local condition had improved. Three days later, the measles eruption was quite in evidence but the suppuration was gradually subsiding. In six weeks, the ear was dry and the wound had healed, with the exception of an opening remaining in the superior anterior portion of the drum.

A year later, while the little girl was playing in the bathtub with her sister, she unfortunately fell with her head under the water. Twenty-four hours later, she had severe pain in the same ear, accompanied with marked vertigo. Forty-eight hours later, there was a profuse purulent secretion and the vertigo had disappeared; there was distinct evidence of mastoid involvement and, with the former history in mind, a mastoid operation was advised. On opening the mastoid, the diseased cells above posterior and anterior to the lateral sinus were opened. The antrum was filled with granulations and purulent secretion oozed from the cells on the posterior border. A number of deep cells were involved, with granulations at the posterior aspect of the tip. A large diseased cell was found posterior to the antrum in the region of the mastoid tenderness. After a rather stormy convalescence the child recovered, but with almost the entire membrana absorbed.

This child was again seen recently, with an acute infection of the same ear, following a nasal infection, but the suppurative local condition responded promptly to the powder treatment. • The powder was used in the mastoid wound also in this instance.

Case 18: Dr. W. L., age 25 years, an interne at Lebanon Hospital, had suffered from chronic suppuration for 24 years, following convulsions as an infant. He had had continuous treatment up to three years ago, but there was a constant purulent and odorous secretion. He complained of dizziness on syringing the ear and a feeling of fullness, and impaired hearing; no pain. The suppuration increased with attacks of acute nasal infection. Examination showed a large central perforation of the right drum, with a small polyp at the posterior border, and considerable secretion in the middle ear. The left ear showed a healed central perforation. The patient had been douching the ear twice daily for many years.

Having observed the results of this treatment on some of the hospital cases in my service, this young doctor asked me to give him the benefit of it. The polyp was removed on the first sitting and the cavity was filled with 0.75 per cent iodin powder. All douching was prohibited. To our mutual astonishment, the ear was dry after three treatments, and the patient became an ardent believer in the

iodin powder dry treatment. The perforation has been reduced in size by stimulating the edges with trichloroacetic acid, which is frequently employed for this purpose. Saw Dr. L. on Oct. 9, 1928, with a dry ear, but perforation, while smaller, is not completely closed.

Case 19: About six months ago, Dr. Beck was kind enough to refer a young woman suffering with a chronic suppuration of the right ear of many years' duration, with a perforation of the drum. I gave her two treatments, and referred her back to Dr. Beck for further observation; but on her return to Chicago she wrote me that the ear was dry and that Dr. Beck found no further treatment necessary.

Before closing, I desire to report briefly three cases of subacute otitis as types which have responded well to this form of dry treatment.

Case 20: K. B., a boy, age $6\frac{1}{2}$ years, three years before coming to me, had had attacks of acute suppurative otitis following acute catarrhal infection of the upper air passages. This child had also had a suppurative process of the middle ear, with a temperature ranging from 100° to 102° . The aural condition was complicated by a pyelitis. The tonsils and adenoids were removed at that time, and the ear condition cleared up following the operation. About six weeks before consulting me, the right ear became involved and discharged spontaneously, but had to be incised later on account of continued pain. There was an elevation of temperature during all this time.

On my initial examination, there was considerable purulent secretion in the right canal and a ballooning of the entire membrana, with a small pinpoint perforation on the lowermost portion. The drum was incised from this small perforation to the superior canal wall and gentle suction through a cannula was employed to remove as much secretion as possible. A 0.75 per cent powder was used in this case for three weeks, during which time the drum became flat and the ear dry.

A week later, the child again developed an acute catarrhal infection of the nose and the drum again became somewhat prominent. The same procedure was carried out for two weeks, after which the drum again became dry.

Case 21: R. B., a girl, age 3 years, sister to the last-mentioned patient, became subject to a rather severe infection of the hemorrhagic type in the left ear. The same procedure was carried out as with the other child. Continued improvement was noted for about

four weeks, after which the membrana again bulged and would not subside under suction and further incision. Following that, there was some obstruction in the middle ear, accounting for this condition. As a last resort before opening the mastoid, some granulations were removed through the incision, and under local anesthesia 5 per cent iodin powder was insufflated. This treatment was followed by steady improvement, and in a week's time the ear became dry, the drum flat, and the incision was healed.

To emphasize the effectiveness of this simple treatment, I herewith report another case that has recently been under my care.

Case 22: Mrs. A. K., age 34 years, desired my opinion as to the necessity of an immediate mastoid operation, as she had been advised by two aurists to have this done without further delay. The history was as follows: Four weeks before consulting me, she had a severe coryza with pain in the right antrum and teeth. The following night she felt a severe pain in the right ear, which ruptured spontaneously. This was followed by a bloody serous discharge for two weeks, which then became purulent. She complained of considerable pain around the ear and teeth, and in the region of the neck.

On examination, the posterior half of the drum was bulging, with a pin-point perforation in the lowermost portion. No attempt had been made to drain this ear, but she had been advised to irrigate it frequently. There was some tip tenderness, but no temperature at the time of my examination. The patient was informed that there was evidence of mastoid involvement but that, in my judgment, no immediate surgical intervention seemed necessary. Drainage of the middle ear was advised, to which she consented. Gentle suction was employed, followed by the insufflation of 0.75 per cent powder. This treatment was repeated daily for 10 days, and as the secretion diminished, the interval between treatments was lengthened. In less than a month, the patient was discharged cured, and deeply grateful for having escaped operation.

106 East 84th Street.

SOME OBSERVATIONS ON THE MODIFIED RADICAL MASTOID OPERATION—REPORT OF CASES.*

DR. MORLEY T. SMITH, New Rochelle, N. Y.

The object of this short paper and report of a few representative cases is to further call attention to the advantages of this procedure in the treatment of selected cases of chronic middle ear and mastoid suppuration.

This series of cases, which will be referred to briefly, were treated at the Manhattan Eye and Ear Hospital, on the service of Dr. John R. Page. During the past eight years, a large number of such cases have been operated by the staff at this hospital, and when the cases have been carefully selected, the results have been, on the whole, very satisfactory.

Although the type of case that is amenable to this operation is quite universally agreed upon, it may not be amiss to reiterate the cardinal points that are observed in our clinic. Those patients with good residual hearing, especially children and young adults, where the perforation is central. Good results are also reported where the perforation has been marginal or in Shrapnell's membrane, and where there is no history nor clinic signs of destructive labyrinth lesions. It is assumed that the discharge is characteristic of mastoid and middle ear suppuration, as opposed to the type commonly referred to as tubal, which has an underlying sinus or nasopharyngeal infection as a primary cause.

This operation, when carefully executed and the cavity given the most painstaking postoperative care, removes most of the dangers that are latent in all these chronic cases of aural suppuration, and in a large percentage of cases a dry middle ear and mastoid cavity are obtained and the hearing, as a general rule, is preserved and not infrequently improved; and these are the factors that mostly commend the procedure. These patients, at times, will have a scant nonodorous mucus discharge following a nasopharyngitis, but this has slight significance. Heretofore, many of these patients were treated by drops of various kinds and other palliative measures until a time arrived when the hearing was practically destroyed and the involvement so extensive that nothing short of a complete radical

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operation was sufficient. Then there is the economic factor. Many patients that we see in large clinics cannot afford the time nor expense necessary for expectant treatment and so the process goes on unchecked, and it is in this class of patient that the operation has a large field of application.

The argument is often advanced that in many of these cases equally good results could be attained by a complete simple mastoid operation. I believe the experience of those who have tried both types of operation, in parallel cases, will be in favor of the modified radical operation. In a number of the cases operated by the writer, and many more seen in our clinic, the simple operation had previously been done, to relieve a chronic otorrhea.

Nothing original is claimed for the operative technique, excepting refinements in minor details, prompted by some unsatisfactory result. On the whole, our technique is essentially the same as that so well described by Dr. Hugh Blackwell, with the exception that we do not remove the so-called epitympanic bridge in all cases. It is possible that failure to do this may explain the unsatisfactory results in some of the cases operated. In many of these cases the pathology is found chiefly in the antrum and good results can be obtained by carefully removing necrotic bone in the mastoid, together with opening the aditus well and removing granulations, without completely removing the bridge. The importance of thoroughly removing all diseased bone in the mastoid, opening the aditus widely and lowering the epitympanic bridge in all cases, in order that the granulations in the aditus and about the incus may be thoroughly removed, is very essential. The posterior canal wall should be lowered to the level of the external semicircular canal and a large meatal opening made to provide complete aeration of the cavity and access to it for dressings. This is of great importance in the experience of the writer.

One of the difficulties in the after-care of these cases is to prevent the granulations that form in the mastoid cavity, and especially in the region of the aditus, from dropping down in the meatus and against the drum. In the writer's experience, this seriously interferes with aeration, and with the resolution in the tympanic cavity, the healing of the drum and dermatization of the mastoid cavity.

A simple and helpful procedure to overcome this condition is to separate carefully the integument from the canal wall before attempting to lower it, and then after the wall has been lowered to the desired level, the flap is cut parallel to the canal wall and about 1 c.m. above it. This flap is then carefully turned over the facial ridge into the mastoid cavity after the bony work has been com-

pleted. We find that this is a great help in keeping down exuberant granulations, and it also acts as a partial skin graft of the cavity. Another effective measure to prevent granulations from the region of the aditus from encroaching over the canal wall and against the drum is to place a strip of vaselin gauze against the drum and carry the tail back over the canal to the region of the antrum. This should be placed at the time of operation and left in place five to seven days. These practical points were suggested in our clinic by Dr. Page. In the writer's experience, skin grafting is not necessary, as most cases dermatize quite promptly when carefully dressed, and especially when the flap of integument has been turned back into the mastoid as previously described.

The ages of the cases, which I shall now review in brief, ranged from 6 to 43 years.

Case 1: S. F., age 6 years. This child had a chronic foul-smelling discharge from the right ear of eight months' duration. There was a central perforation in the drum behind the malleus. Adenoids and tonsils had previously been removed and the ear had been treated by local measures. Before operation, the patient heard conversation voice at 3 feet, and whisper at 18 inches. A modified radical operation was performed, Feb. 7, 1926. There was extensive involvement in the antrum, some cholesteatomatous material in the aditus and middle ear. The epitympanic bridge was not removed. April 18, the mastoid was completely dermatized, the middle ear was dry, and the drum healed. Six months after operation, patient heard conversation voice at 8 feet, and whisper at 4 feet. When recently seen, her condition remained unchanged.

Case 2: M. D., age 33 years. The patient had a persistent foul discharge from the left ear, following a simple mastoid operation performed at the Manhattan Eye and Ear Hospital, in March, 1925. This patient had a facial paresis after her first operation, which had practically cleared up. Before operation, the patient heard conversation voice at 10 feet, and whisper at 2 feet.

There was a small central perforation. On June 15, 1926, patient was operated. There was considerable necrosis in the antrum and the roof of the aditus. The aditus was filled with infected granulations, the facial nerve was found exposed for a distance of $\frac{1}{2}$ c.m. in the vertical portion and covered with granulations. The epitympanic bridge was taken down. On July 15 of the same year, the patient heard conversation voice at 15 feet, and whisper at 2 feet. Mastoid cavity dermatized and a small perforation in drum persisted; the middle ear was dry. Following a nasopharyngitis, she occasionally has a nonodorous discharge from this ear.

Case 3: H. A., age 19 years, had a chronic foul discharge from right ear for 18 years. There was a central perforation of the drum, with pus and granulations, seen in the middle ear. In spite of this long history, the patient heard conversation voice at 3 feet, and whisper at 1 foot. Patient was operated, Sept. 22, 1928. There was extensive involvement in the antrum and roof of the aditus. The aditus was blocked with dense granulations. The bridge was not removed. On Jan. 19, 1929, the perforation was much smaller, the cavity was completely dermatized and the tympanum was dry. When recently seen, he heard conversation voice at 10 feet, whisper at 3 feet, and middle ear and mastoid were dry.

Case 4: M. P., age 22 years, had a chronic foul discharge from the left ear of two years' standing. She also complained of headaches and dizziness at frequent intervals. There was considerable foul discharge in the canal and middle ear and the drum showed a fairly large central perforation. Before operation, patient heard conversation voice at 12 feet, and whisper at 6 feet. On March 1, 1927, a modified radical operation was done. The antrum, aditus and middle ear contained granulations and debris. Re-examination in December, 1927, revealed the cavity dermatized, the middle ear dry and the perforation reduced to a pin point. The hearing remained the same. The headaches and vertigo had disappeared. Since then there has been recurrence of a foul discharge with further destruction of the drum, coincident with repeated attacks of nasopharyngitis. The hearing is failing and it will probably be necessary to do a complete radical later.

Case 5: H. H., age 22 years, gave a history of chronic discharge from the right ear for seven years. The canal contained a large polyp, which obstructed a view of the drum. This patient heard conversation voice and whisper at 20 feet. On July 24, 1926, a modified radical was performed. He had moderate involvement in the middle ear and mastoid; the polyp was removed after lowering the canal wall, when a small central perforation was noted in the posterior half of the drum. One month later, the perforation was entirely healed, the mastoid was dry and dermatized, and the hearing as before operation. Recent examination reveals that the condition remains unchanged.

Case 6: H. P., age 16 years, had a foul discharge from the right ear for 11 years. Hearing at this time was, conversation voice at 10 feet, and whisper at 2 feet. He had a fairly large central perforation with irregular edges and many granulations on the promontory. May 31, 1927, a modified radical was done and the epitym-

panic bridge removed. Due to faulty technique in dressings, granulations piled against the drum and blocked the aditus, and he was readmitted in July for removal of the granulations. Following this he made a rapid recovery, and on Aug. 27, 1928, he was entirely healed, the middle ear was dry, and a small central perforation persisted. This case well illustrated the importance of postoperative care, which was referred to previously. In January, 1929, his hearing was, conversation voice, 18 feet, and whisper, 10 feet; a small perforation in the drum persisted, and the middle ear was dry.

Case 7: S. P., age 13 years, gave a history of a persistent foul discharge from the right ear for four months. The drum showed a large central perforation. Hearing was, conversation voice at 15 feet, whisper at 12 feet. Patient was operated Jan. 3, 1927, and considerable involvement of the antrum and of the tegmen antri was noted. The epitympanic bridge was not taken down. After six weeks the drum was entirely healed, and has remained so. The hearing has remained as before operation. To my mind, this case illustrates the maximum to be obtained by this procedure.

Case 8: J. J., age 43 years, gave a history of chronic discharge from the right ear of 10 years' duration, with recurrent attacks of vertigo. The drum showed a central perforation of moderate size. Patient heard conversation voice at 5 feet, and whisper at 2 feet. On March 15, 1926, a modified radical was done. The epitympanic bridge was removed in order to thoroughly remove the dense infected granulations in the aditus and middle ear. On July 16, the mastoid was completely dermatized, the middle ear dry, and the perforation was much smaller. Two months later, the drum was completely healed and she heard conversation voice at 15 feet, and whisper at 6 feet, and this was her status when seen in January, 1929.

Case 9: M. L., age 7 years. Two years previously, the patient had a simple mastoid done, following measles. Since then there had been a foul discharge from the ear and a persistent sinus in the mastoid wound. The patient was anemic, languid and underweight. There was a fairly large irregular central perforation in the drum and the middle ear contained pus and granulations. Patient heard conversation voice at 8 feet, and whisper at 3 feet. On April 15, 1927, a modified radical was performed and the posterior wound closed completely. There was extensive necrosis in the region of the antrum and in the roof of the aditus. The epitympanic bridge was taken down. Ten days after operation, the patient began to run an intermittent septic temperature, appeared very ill and complained of pains in the left ankle, which was swollen, red and ten-

der. The clinical signs, together with a blood culture that showed a hemolytic streptococcus, warranted the diagnosis of a lateral sinus involvement with metastasis into the ankle. A sinus and jugular operation was done and the sinus showed definite evidence of disease in the wall, but no thrombus was present. Following this operation, the temperature abated and her general condition improved. A few days later, she developed pain, tenderness and spasticity in the right hip joint, temperature again went up, and her condition seemed desperate. She was given a transfusion at this time, and this was repeated in four days. I am convinced that the transfusions undoubtedly saved the day in this case. Subsequently, the left ankle and right hip were incised and pus drained. Three months later, the mastoid cavity was completely dermatized, the middle ear was dry and the drum eventually healed completely, and has remained so. She eventually regained complete function in the ankle and hip joint, and when recently seen she heard conversation voice at 20 feet, whisper at 10 feet, and she is entirely well.

Case 10: F. T., age 16 years, gave a history of foul smelling discharge from the right ear of four years' duration. There was a medium-sized perforation and the tympanum contained pus and granulations. Patient heard conversation voice at 10 feet, and whisper at 3 feet. On Jan. 15, 1927, a modified radical was performed and the bridge taken down on account of the extensive attic involvement. In three months, the mastoid had completely dermatized, the middle ear was dry, and the perforation in the drum was decidedly smaller. Re-examination in January, 1929, showed a small central perforation, middle ear dry, and the patient heard conversation voice at 18 feet, and whisper at 12 feet.

In conclusion, I wish to state that I am thoroughly convinced that this operation has a definite place in otological surgery and I believe the few cases presented give a fair idea of the results that may be obtained.

Pintard Building.

**THE CLINICAL PATHOLOGY OF MASTOIDITIS,
WITH SPECIAL REFERENCE TO BACTER-
EMIA AND TREATMENT BY
BLOOD TRANSFUSIONS.***

DR. ANDREW A. EGGSTON, New York.

There is very little new to be added to what is already known regarding laboratory methods in otology. However, it will be worth while to stress a few of the procedures from the laboratory viewpoint.

The typing of bacteria in infections of the ear is important and careful cultures should be taken from every infected ear at the time the myringotomy is done and the character of bacteria present determined. The knowledge thus gained may be of some value in the prognosis of the case, and it is of interest to know if the same bacteria are present in the mastoid disease and complications as were found in the pus from the ear. The organisms of most importance which have come under our observation have been the hemolytic streptococci. These bacteria predominate in the number of positive cultures from the ears and mastoids and in the number of cases having complications.

Next in importance are the various types of pneumococci. Type III pneumococcus (*streptococcus mucosus capsulatus*) is the one that receives most attention from the otologist, because experience has shown that this infection frequently causes rather serious complications. It is unquestionably a bad type of organism to find in the mastoid, but not universally so, as some of these cases recover as quickly and perfectly as the streptococci or other pneumococci. The *streptococcus mucosus capsulatus* mastoiditis is likely to be complicated by delayed brain abscesses, meningitis or pneumonia.

Routine urinalyses are always made previous to any operative procedure. Occasionally, large quantities of albumin and sugar are found. In these cases a complete blood chemistry is done and the patient thoroughly metabolized, either before or immediately after operative procedures.

Blood counts are utilized to about the same extent as in other septic diseases. An increase in the white cells, or an increase in

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the polymorphonuclears shows that the process is advancing, and it is well to follow the count at rather frequent intervals—every 12 or 24 hours, as in appendicitis. We have paid a great deal of attention to the immature polynuclear counts (modified Arneeth count) and have found that they parallel the polymorphonuclear counts. The immature cells are the polymorphonuclears that have either a horse-shoe nucleus or only two lobes. Normally, they are present, up to about 10 per cent of the polymorphonuclears. In a septic process the immature cells may increase to 50 per cent. At times blood counts are rather disappointing, because the mastoid may be involved, with very little toxic absorption and very little temperature; likewise, very little change in the leukocyte count. In complicated mastoid diseases, blood counts are of about equal significance as in the diagnosis of simple mastoiditis.

Blood cultures are probably the most important of any laboratory procedure in following complicated mastoiditis. Sometimes it is good policy to culture the blood before a simple mastoidectomy, because the blood culture may early become positive, and when this is true, no time need be lost in obliterating the sinus. Ordinarily, a simple mastoidectomy is done and in a few days, if the patient continues septic, it is of extreme importance to determine if the bloodstream contains bacteria. A bacteremia following an acute mastoiditis is usually due to a septic lateral sinus thrombosis, provided a pneumonia and bacterial endocarditis have been eliminated. While a positive blood culture is quite significant of septic sinus thrombosis, a negative is of limited value. Two or three negative cultures do not exclude a sinus involvement, and one may have to resort to the Ayer's spinal manometer test to see if there is any lateral sinus obstruction. There are several explanations of the variable findings in blood cultures. In the parietal type of thrombus, where the blood continues to circulate and organisms are washed off into the bloodstream, the culture is usually positive. On the other hand, the bloodstream is capable of destroying many bacteria and render itself sterile. If the sinus is completely closed by a blood clot, the flow of blood is entirely interrupted and the culture is likely to be negative. In cases where the thrombus has become autolysed the bacteria will be thrown into the circulation and a large number of bacteria can be secured in the culture. A positive culture is of great value in diagnosing sinus thrombosis, while a negative one is of limited value. Below is given a table showing the number of blood cultures at the hospital during the last three years, with the percentage of negative and positive findings. These cultures were taken on clinically suspicious cases, not necessarily positive ones. A great many of the

cultured cases undoubtedly were not sinus thrombosis cases, but had some other complications.

<i>Year</i>	<i>Total</i>	<i>Negative</i>	<i>Positive</i>	<i>Percent Positive</i>
1927	146	124	22	15%
1928	151	127	24	16.3%
1929	155	130	25	16%

The Ayer's manometer test is of value to determine if a case has sinus thrombosis and it is also helpful in determining which side is involved, in a bilateral case.

The spinal fluid examinations in mastoid diseases are also of importance. It is well to have a lumbar puncture and examination of the spinal fluid in all obscure septic cases following mastoiditis where meningeal symptoms are present. I do not think this procedure harmful, as claimed by some, but is of diagnostic assistance. Outside of the total cell count and the character of the bacteria present, one can get a certain amount of information by studying the character of the cells. If the polymorphonuclears predominate, it is a very acute process. The polymorphonuclear cells will decrease and there will be found a relative increase in the mononuclear cells if the meningeal process becomes localized, or if there is abscess formation. Other tests are made on the fluid, such a sugar, lactic acid and bacterial cultures. Positive cultures in the spinal fluid are not always obtained even though bacteria are found by stained films. This is a good prognostic sign, particularly if the pus and bacteria have been concentrated before culturing. If there is a profuse growth of hemolytic streptococcus the prognosis is always bad.

After this very brief resumé of the clinical pathology, I wish to refer to our experience with blood transfusions in mastoid disease and its complications. The complication most common to mastoid disease are erysipelas, cervical lymph adenitis, sinus thrombosis, bacteremia, pneumonia and septic meningitis.

In the last 15 years we have been interested in treating the complications of mastoiditis, by building up the patient's general resistance with blood transfusions. The number of cases studied makes ours a rather unique experience in treating septic conditions in otology by blood transfusions. Any seriously ill patient who must submit to a major operation, complicated by a septic infection, had best have his general resistance increased by blood transfusion. The general surgeons are recognizing the benefits of this preliminary preparation. Mastoid infections so frequently occur after scarlet fever, measles, influenza, diphtheria — all very devitalizing diseases — and there is no place in all medicine where such beneficial results can

be obtained in transfusions following these infections, particularly in children. There seems to be something in the adult blood that greatly stimulates children's resistance; and recovery, at times, is most spectacular following transfusions. It may be that a proportionate larger amount of blood is given them than in an adult. On the other hand, it is possible that adult blood contains many immune substances, not yet developed in children's blood. Even where there are no serious complications and the child is below par, blood should be given, because it shortens the period of convalescence. Therefore, in every debilitated, anemic child a dose of blood is beneficial. In the complicated cases following mastoid operation, where there is a continued septic temperature, but no definite signs of localization, the simpler complications can be relieved without operation by blood transfusion, and in erysipelas or deep cervical adenitis, the septic course, in many instances, will subside.

In the more severe complications, especially in septic sinus thrombosis, where the patient has a bacteremia, it is essential to operate on the sinus and eliminate the septic process, as blood transfusion alone will not take the place of the surgical removal of pus, regardless of its location. The procedure of choice is to remove the septic process surgically and subsequently build up the patient's resistance and combat the organisms that have already entered the bloodstream. I am sure that the mortality has been greatly reduced at the hospital by giving blood at the right time and in proper dosages. Following operation in the septic sinus cases, one should not wait to see what the operative result will be, but the patient will be served best if blood is given to combat shock and reduce the possibility of future complications. A number of cases of bilateral mastoid disease, with definite sinus thrombosis symptoms where the surgeon has not felt certain as to which sinus is involved and surgical procedure delayed, have been successfully treated with blood transfusion. One case is recalled, a child, age 8 years, with double mastoiditis following measles and scarlet fever, complicated with hemorrhagic nephritis and bronchopneumonia, which was treated by transfusion, with complete recovery.

A very interesting observation has resulted from following the septic sinus cases, in that the patient's blood, in some instances, is rendered bacteria-free immediately following the giving of the transfusion. It has also been noted that several days or weeks following the septic sinus disease, some of the patients will develop a recurrence of fever and septic characters which is frequently the beacon sign of a metastatic process which usually develops as a septic arth-

ritis or subcutaneous abscess. These secondary processes sometimes only require simple drainage and should not be a serious handicap to convalescence. It may be advisable to repeat the transfusion if these complications occur. The interesting feature is that these secondary processes were rare before the institution of blood transfusions. This procedure helps the patient to survive sufficiently long for localization of the infection. Without the blood stimulation the patient would probably succumb to the infection. In addition to the more superficial septic metastatic manifestations the spleen, kidney and particularly the lung, may become involved.

The lung is frequently involved in an inflammatory process following a bacteremia subsequent to a mastoiditis or sinus thrombosis. The process is usually a metastatic septic pneumonia which may not show physical signs for several days, or not at all, as the process may be deeply seated in or near the hilus. Sometimes X-ray will reveal the process. These cases run a very atypical course of fever and sepsis, being more like that of sepsis than of true pneumonia. The temperature is likely to be very erratic and convalescence is at times by crisis, but frequently there is a gradual return to normal. Blood transfusions are unhesitatingly used in these cases with most favorable results. Usually one transfusion is sufficient. In no case have we noted any cardiac failure; on the other hand, the patient is more comfortable and respiration is rendered more physiological. Especially in children have the results in pneumonia been particularly gratifying, but it should also be used in adults, but using relatively smaller doses of blood.

There are other complications of mastoid disease in which the results, in spite of all measures of treatment are not as favorable as the ones above discussed and regardless of intense interest and efforts with many transfusions, the complications prove fatal. Unfortunately, some cases develop a septic meningitis, due to a streptococcus or pneumococcus, and when this occurs, nothing that we have done has prevented a fatal termination. Transfusions, drainage and dye injections have been faithfully used without avail. This gloomy prognosis does not apply entirely in some cases of local meningitis or abscess formation where drainage and transfusions have been beneficial and several cases thereby recovered. Multiple pulmonary abscesses occasionally follow a bacteremia in which the prognosis is not favorable, regardless of treatment.

The following case reports were selected from a large number and represent typical cases with many of the complications discussed in this presentation.

A. B. The patient, a female child, age 18 months, was admitted to the hospital for tonsillectomy, Dec. 15, 1924, and was discharged the next day. Dec. 19, the patient returned with double acute otitis media, when a double myringotomy was performed. At this time the temperature was 105.2° , blood count, 14,200; polys., 66 per cent. Urine showed acetone and diacetic acid. Temperature showed little change after myringotomy. Physical examination revealed a post-operative pneumonia. Temperature continued around 105° for four days after operation, when a transfusion was decided upon and 240 c. c. of father's blood was administered. Temperature rose immediately to 109.2° , and child became cyanotic and apparently in extremis. Stimulation was given, consisting of digefolin, adrenalin and oxygen. The temperature was reduced by cold sponges, alcoholic rubs and electric fans. The child's condition improved and the temperature, in three hours, was 99.8° . In 24 hours the temperature had returned to 105° and remained so for two days, following which it returned to normal. The temperature remained normal and patient recovered, being discharged from the hospital, Jan. 3, 1925.

D. D. The patient, a male child, age 1 year, admitted to the hospital on April 25, 1924, with right mastoiditis, following an ear that had discharged two months. Temperature on admittance, 105.2° . Mastoidectomy was immediately done, showing granulations and pus. The sinus was exposed, but was apparently normal. Culture of mastoid showed hemolytic streptococcus. In a few days the child became desperately ill, with temperature between 100° and 105° . Chest examination, on May 1, showed right lower bronchopneumonia. Transfusion of 250 c.c. of blood was given on May 2, 1924, at which time the temperature was 104.4° . There was practically no reaction. On the other hand, the temperature immediately dropped to a subnormal of 96° , returning to normal immediately and remained so. Patient recovered and left the hospital, May 14, 1924.

E. M. Patient, a male adult, age 30 years, admitted to the hospital, June 6, 1925, with purulent otitis media, impaired hearing, vertigo, with some conduction lesion. Patient had been observed in the clinic for one week. A radical mastoidectomy was done, June 6, 1925. The outer and middle ear contained cholesteatoma. The malleus and incus were necrotic. Dura and lateral sinus were exposed over small areas. Four days after operation, the temperature rose to 104.2° . The tissues adjacent to wound showed erysipelas. White blood count, 12,000; polys., 90 per cent. The wound was opened,

followed by intermittent temperature for three days, then normal for three days, followed by a chill and temperature of 104° . Patient toxic. Tenth day post-operation, there was a brisk hemorrhage from a small perforation in the sinus wall, while dressing was changed, which was easily controlled. This was followed by chills. Sinus and jugular operation were advised following consultation. Blood culture, on June 10, was negative. June 13, the jugular was resected and the lateral sinus opened, followed by general improvement with normal temperature after four days. Blood culture, on June 16, was negative. On the seventh day, the patient had another chill, with temperature of 103° and pain in the right side of face and temple. Patient had now symptoms of facial phlebitis. The patient was given 500 c.c. of blood, with improvement of his general condition.

The patient complained of severe headache. Eye grounds showed some blurring of disc margins. On July 1, patient had chill and temperature of 103° . Respiration, 25. Pain in right chest, cough and bloody sputum. *Diagnosis:* Septic pulmonary infarct in right middle lobe anteriorly. Patient in extremis. Blood culture showed a profuse growth of hemolytic streptococcus pyogenes. Blood transfusion of 500 c.c. was given. The circulation, which was previously embarrassed, was relieved by transfusion. The general condition was improved. For seven days, temperature ran between 99° and 101° . Cough and bloody sputum disappeared and chest became clear. In 10 days, temperature was normal and patient continued to improve and was discharged, Aug. 1, 1925.

J. N. The patient, a boy, age 12 years, with a history of scarlet fever and measles within a period of four months, followed by double otitis media, with myringotomies and persistent discharge. He was admitted to the hospital, March 3, 1923, and operated upon for double mastoiditis. Blood count, before operation, 19,700; polys., 80 per cent. Urine showed few pus cells and hyaline casts, with trace of albumin. Cultures of both mastoids showed hemolytic streptococcus pyogenes. Temperature after operation varied from 101° to 104° for 10 days, with daily blood counts ranging from 10,000 to 20,000, and a high relative polymorphonuclear index showing a distinct septic factor. On March 18, 10 days after mastoid operation, the lateral sinuses were exposed, but neither was opened because of the double mastoiditis and the absence of definite indications as to which sinus might be involved. The patient continued to show a marked septic picture, both as to temperature and blood counts. Repeated urinalysis showed marked amount of pus blood, hyaline, granular and

pus casts, indicative of a marked acute nephritis. Two blood cultures failed to show bacteria. On March 20, 400 c.c. of blood was given, with some improvement. Patient continued highly septic, however, and on March 28, another blood transfusion of 420 c.c. was given, with decided improvement in patient's condition. At this time the leukocyte count was 10,000, with 75 per cent polys. Temperature was reduced to normal and did not go above 100° for four days. On the sixth day following the second transfusion, the temperature rose to 104.8° and the leukocyte count went to 18,000, with 78 per cent polys. The temperature remained rather high until April 6, when 520 c.c. of blood was given. Temperature and blood count continued septic. Blood count ranged from 18,000 to 31,000 and the polymorphonuclears, 78 to 85 per cent. On April 11, the temperature was 105.8°. On April 12, 450 c.c. of blood was given. The patient improved in general appearance, became more alert, temperature returned to 100° in 24 hours and blood count dropped to 12,000. Urine began to clear, blood entirely disappeared, with decided decrease in the amount of albumin, pus and casts. Patient's septic condition gradually receded and there was a subsequent uneventful recovery. Patient was discharged from the hospital, May 13, 1923, restored in health.

A. S. Patient is a young man, age 17 years, with a histological angiofibroma of left antrum of three years' duration, with operation on Feb. 20, 1924, with much hemorrhage. The next day, patient had a chill and temperature of 104°. Temperature improved and continued for six days, when it again reached 104°. Ears examined and left myringotomy performed. Temperature again improved for seven days, when it again began to rise, with a leukocytosis and with left mastoid symptoms. Mastoidectomy was done 10 days after myringotomy, showing free pus and granulations. Lateral sinus exposed. Temperature and septic picture improved for five days, when the temperature went up to 106°. Blood culture at this time was negative. Patient was again operated upon and lateral sinus extensively exposed on March 22, 1924. On March 26, the patient failed to improve and the blood cultures showed three colonies of hemolytic streptococcus pyogenes per 1 c.c. of blood. The lateral sinus was now opened and the jugular was resected. Blood culture three days later showed 7 colonies of hemolytic streptococci. Physical examination of chest showed some consolidation of left lower lung, with some pleurisy. Patient received first transfusion of 800 c.c. of uncle's blood. Temperature before transfusion, 104.6°; subsequent, showed some decline. However, the blood culture two days

following first transfusion showed 200 colonies of hemolytic streptococci per 1 c.c. of blood. Two days later the patient received 920 c.c. of brother's blood. Temperature declined and was normal on third day. Three blood cultures on the fourth and fifth day following last transfusion were negative. The temperature remained practically normal. Patient improved rapidly, septic symptoms disappeared and patient completely recovered.

This patient has been used as a donor in three other cases with hemolytic streptococcus septicemia, with good results.

R. G. Patient is a boy, age 7 years, with discharging right ear of two weeks' duration, which followed a severe attack of measles; was admitted to the hospital, June 4, 1924. Temperature, 103.4° ; leukocytes, 11,000, with 75 per cent polys. Urine negative. Right simple mastoidectomy, June 5. The mastoid showed definite pathology. Culture showed a profuse growth of hemolytic streptococcus pyogenes. The temperature continued septic, frequently going up to 104.6° . Patient highly septic, both as to temperature and blood count. June 10, right sinus was uncovered from knee to jugular bulb, without bleeding. Sinus resected. Right internal jugular resected and wound left open. Patient was given 350 c.c. of blood immediately after operation. Blood culture, June 11, negative. For the next few days there was some improvement in the septic condition and temperature decreased to around $101-103^{\circ}$. Several physical examinations showed no involvement of heart and lungs. Spinal puncture revealed normal fluid; blood culture, negative. June 15, patient continued septic, with chills, high temperature and leukocytosis. Involuntary in stools and urine. June 16, patient was given second transfusion of 400 c.c. of blood, followed by chill and temperature of 106.6° . Blood culture again negative. The temperature continued to vary from 104° to 106° , with frequent chills. June 20, patient was given a third transfusion of 400 c.c. of blood. Patient remained septic, desperately ill. Temperature gradually became lower, varying from 102° to 103° , with slight chills. This condition continued for several weeks. On June 30, temperature again rose to 104.6° . July 2, a fourth transfusion was given, consisting of 400 c.c. of blood. Temperature continued to run around 104° to 106° , with chills and sweats. Blood culture, on July 7, showed 332 colonies of hemolytic streptococcus pyogenes per 1 c.c. blood. Physical examination showed rale scattered throughout the chest. Heart rapid, but no murmurs. Patient's condition gradually grew worse and he died, July 11, 1924.

R. S. Patient a girl, age 14 years. History reveals discharging right ear, 10 years. Adenoid and tonsil operation, eight years ago.

Admitted to the hospital with a diagnosis of mastoiditis, right ear, for immediate operation. Radical mastoidectomy was performed, Feb. 6, 1924. Temperature, 103.6°. Mastoid showed considerable granulation and pus. Temperature declined after operation and remained so until Feb. 16, at which time it was 105.2°. Leukocyte count, 12,000; polys., 72 per cent. Blood culture negative. Second blood culture was taken on Feb. 18 and showed three colonies of streptococcus hemolytic pyogenes per 1 c.c. of blood. Culture from mastoid wound showed same organism. Leukocyte count, 12,600; polys., 76 per cent. Feb. 19, blood culture showed a profuse growth of streptococcus pyogenes. Diagnosis of right sinus thrombosis was made. The sinus was exposed and the jugular resected. The vein showed a large clot. The temperature declined somewhat in the following two days, but continued to show septic fluctuation. Feb. 21, a transfusion was given of 520 c.c. of blood. Patient at this time was suffering from a bronchopneumonia, with physical signs in the left upper and right lower lung. Patient was in extremis during transfusion and it was necessary to give oxygen. Spinal fluid examination negative. There was not much improvement in the temperature and, Feb. 25, 400 c.c. of blood was given. A blood culture was taken the following day, which showed no growth. General condition improved, but the distinct septic temperature continued until March 3, when a third blood transfusion of 500 c.c. was given. The temperature dropped and fluctuated in the vicinity of normal. On April 20, a plastic operation was performed. On April 27, the temperature rose to 103.2°. The leukocyte count varied between 10,000 and 20,000. Patient was discharged, May 7; temperature normal, apparently entirely restored to health. The patient since this time has gained 20 pounds.

J. G. Patient, a female child, age 7 years, was admitted to the hospital, May 7, 1928. Past history showed measles and mumps and discharging ear for three years. On week previous to admission, the child developed severe tenderness over the left mastoid, which continued, with profuse discharging ear. Patient operated upon, May 7, after admission to the hospital for a simple left mastoid; temperature, 104°. Child's condition was very poor. Mastoid extremely involved with perisinus abscess. Sinus was exposed throughout and resected. The jugular was resected, which was completely thrombosed, without bleeding at either end. Jugular thrombosed to clavicle. Patient left operating room in very poor condition; pulse, around 200. Was given 500 c.c. saline. Culture of mastoid and sinus showed profuse growth of hemolytic streptococcus. Blood

culture negative. Leukocytes, 34,000; polys., 82 per cent. Patient's condition so poor that transfusion of 480 c.c. of blood was administered. Patient's temperature continued highly septic and general condition poor. On May 12, a second transfusion of 480 c.c. of blood was given, with some improvement. On May 19, a third transfusion of 480 c.c. of blood was given, because temperature had again gone up to 104°. This was followed by a continued improvement in patient's general condition. The temperature continued to run septic for several days before returning to normal. Patient discharged entirely well on June 9.

While this case did not show positive blood cultures, blood transfusions were resorted to to combat infection and severe postoperative shock.

M. B. The patient, a female child, age 4 years, was admitted to the hospital, Oct. 14, 1926, with a history of having had tonsils and adenoids removed one week prior to admission. Third day following tonsillectomy, left ear became acutely involved and was opened, with marked discharge. Temperature, 101°. On the fourth day following tonsillectomy, right ear showed symptoms of acute involvement. On day of re-admission to hospital, both ears were discharging profusely. There was also a foul-smelling nasal discharge. On Oct. 17, a double simple mastoidectomy was performed, both mastoids containing pus and granulations. Culture from both mastoid wounds showed hemolytic streptococcus pyogenes. Temperature at time of operation was 102°; 24 hours following operation, 105°. Temperature continued highly septic and, on Oct. 26, a lumbar puncture was done. Spinal fluid was negative. White cell count, 20,000; polys., 84 per cent. Blood culture negative. Urine showed few pus cells. Culture of nasal discharge showed hemolytic streptococcus pyogenes. On Oct. 28, a transfusion of 380 c.c. of blood was given, followed by a rise in temperature to 107°, with immediate decline to normal. On Oct. 31, temperature rose to 104°, and following day a second transfusion of 300 c.c. of blood was given, followed by temperature of 107°. Child highly septic and temperature continued around 103°. On Nov. 6, 5 c.c. of 1 per cent mercurochrome was given intravenously. This was repeated on the seventh, without beneficially influencing the condition. In fact, the patient appeared more toxic. On Nov. 8, a third transfusion of 300 c.c. of blood was administered and temperature went to 105°, soon returning to normal, and patient appeared better. Temperature remained at a lower average for there days, when it rose to 105°. On Nov. 12, the left jugular was resected and sinus obliterated, showing blood clot. Blood

culture negative. Urine showed few pus cells. Blood count, 32,000; polys., 92 per cent. Physical examination, on Nov. 18, showed evidences of consolidation in the right lower lobe with pleuritic friction rub. Heart negative. X-ray of chest showed no definite involvement. Immediately following the jugular resection a fourth transfusion of 480 c.c. of blood was administered, with slight temporary improvement. Temperature continued septic, with daily average of 102° for 14 days. On Nov. 27, the temperature again rose to 105° and then began to decline. On Nov. 29, a fifth transfusion of 350 c.c. of blood was given. Following this, the temperature remained at an average of about 100° for several days. At this time the patient complained of severe pain in left knee and popliteal space, which was swollen, red and tender. This condition lasted for a week without suppuration. At this time inflammatory changes occurred in the left hip joint, which continued for 10 days, when it was noticed that the left leg was considerably shortened. Patient's general condition somewhat improved, with temperature varying between 100° and 101°. Appetite improved and patient began to gain weight. On account of the hip condition the patient was referred to the Orthopedic Hospital, where the hip joint was opened and considerable pus found under pressure. Culture showed streptococci and staphylococci. From this time the patient improved, and recovered. Patient was discharged Dec. 6, 1926.

C. H. The patient, a young man, age 19 years, slightly deaf, was operated upon when 5 years old for left mastoiditis. Present illness began one week before admission to the hospital, with pain in both right and left ear. Both ears showed purulent discharge. Patient was admitted to the hospital, June 10, 1924; temperature, 101°. Right mastoidectomy was performed, June 11. Temperature remained about the same. The left mastoid was operated upon, June 18. Cultures of both mastoid wounds showed profuse hemolytic streptococcus pyogenes. Temperature gradually increased and patient became highly septic, with frequent chills. Both mastoid wounds reopened on June 20, when the temperature was 106°. Blood culture, June 22, showed hemolytic streptococcus pyogenes. The temperature and septic condition of the patient remained. On June 24, blood culture showed a moderate growth of hemolytic streptococcus pyogenes. On June 25, the right sinus and jugular were resected and patient was given 600 c.c. of blood. At this time the patient's condition was very bad and cultures of lateral sinus and jugular showed hemolytic streptococci. Patient continued extremely septic, with temperature remaining around 105° to 106°. Blood culture

showed numerous colonies of hemolytic streptococcus pyogenes. On June 28, a second transfusion of 500 c.c. of blood was given, with improvement of general condition, and the temperature was reduced to 102°, where it remained for three days, when it again increased to 105°. On June 30, blood culture was negative. A third transfusion of 600 c.c. of blood was administered, July 2. Following this the temperature continued to vary from 105° to 107°, with frequent chills and perspiration. Physical examination revealed moist rales on left lung and some left-sided pleurisy. Blood culture negative. On July 10, a fourth transfusion of 550 c.c. of blood was given, following which there was a slight improvement in the patient's condition. The temperature on the average remained at a lower level. He continued to have daily elevation of temperature up to 102°, with some pain and tenderness in the left shoulder joint. On July 25, the left shoulder joint showed a definite suppurative arthritis. The shoulder joint was opened and drainage established. Blood culture negative. Following this the patient gradually and slowly recovered and was discharged from the hospital on Sept. 3, 1924, entirely restored to health.

The patient has been used as an immunized donor in hemolytic septicemia cases.

F. S. The patient, a well developed man, age 43 years, complained of pain in both ears, with temperature of 102° for one week, following a submucous resection. Physical and clinical examination revealed double mastoiditis; left, more marked. He was admitted to the hospital, Aug. 19, 1925, and operated upon the following day for double simple mastoid. Both mastoids showed pus and granulations, with diseased cells. Following mastoid operation, the temperature ran from 101° to 106°. Patient septic, heavy chills and sweats. On Aug. 22, blood culture showed streptococcus mucosus capsulatus. Right and left sinuses were exposed. The right sinus was opened and found diseased, and the right jugular vein resected. Patient continued septic, with temperature of 106°. The chest examination showed an extensive lobar pneumonia. Sputum showed many pneumococci of Type III. Same organisms were found in mastoid and in the blood culture. After consultation, it was decided to treat the patient with transfusions. The first transfusion of 700 c.c. of blood was given, Aug. 7. Subsequently, the temperature varied daily from 99° to 106° for five days. On the sixth day after the first transfusion, a second one of 670 c.c. of blood was given, with decided improvement of temperature and septic picture. Patient continued to improve, but developed a metastatic septic arthritis in

the right wrist joint of moderate severity. He was discharged, Oct. 9, 1925, completely recovered.

W. M. The patient, a male child, age 9 years, was admitted to the hospital, July 23, 1929. Left mastoidectomy, five years ago. Right ear also discharged five years ago, but was not operated upon for mastoid. Present history revealed a discharge from previous mastoid wound, of nine days' duration. No history of acute infections. Upon physical examination, the eyes, nose and throat were negative. Right ear showed a reddened canal, with normal drum membrane. Left ear showed a very small canal and membrane could not be seen. A small discharging sinus behind the left ear. Heart and lungs were negative. Diagnosis of left secondary mastoiditis was made and operation for this condition was performed, July 26, revealing many necrotic cells and sequestered bone, with encysted parasinus abscess. Lateral sinus exposed to bulb, cerebellar dura exposed. Antrum cleared and aditus curetted. Temperature on admission was 103° , with variations from normal to 105° for three days, when a second operation was performed. Patient was given a transfusion of 400 c.c. of blood following the operation. Temperature remained around 100° for three days, when it rose to 105° . Patient very septic. Leukocyte count, 25,000. Blood culture negative. Temperature receded and remained around 100° for three days, when it again rose to 104.8° , with septic symptoms. This time it remained high for four days, when the lateral sinus was further exposed and the left jugular tied. Facial vein was also ligated. This was done on Aug. 6. A transfusion of 350 c.c. of blood was given on Aug. 6. A transfusion of 350 c.c. of blood was given on Aug. 7. Temperature, 104° . Child desperately ill. Very septic. Blood culture negative. Patient's temperature continued to vary from 98° to 105° and, on Aug. 12, the lateral sinus was further exposed to the torcular. A third transfusion of 350 c.c. of blood was given after this operation. Patient continued very septic and had daily chill; markedly dehydrated; unresponsive to food or other reactions. Temperature continued to vary from 99° to 105° for week, when another transfusion of 350 c.c. of blood was given. The child's general condition improved, but temperature continued septic, varying from 98° to 105.6° , with daily recessions. Aug. 27, another transfusion of 300 c.c. of blood was given. Temperature, however, continued, somewhat more septic, running daily to $104-105^{\circ}$, until Sept. 1st, when another transfusion of 350 c.c. was given, following which the temperature came down by lysis and remained below 102° and from where it gradually receded to normal. The child's general

condition had greatly improved, in fact it was clinically evident that he was on the road to recovery. The patient gradually convalesced, sepsis disappeared. A brain hernia developed in the large operation wound, but the child continued to gain in weight and strength and was discharged cured, Oct. 23, 1929, with recession of brain hernia and complete restoration of health.

Many other case records are available to supplement the findings presented above and in support of the striking and beneficial results from blood transfusions in the types of sepsis following mastoid infections and complications. Transfusions have become a very important addition to the treatment of these cases, both in reducing the mortality and hastening convalescence.

Manhattan Eye, Ear and Throat Hospital.

A NASAL SEPTUM TREPHINE.

DR. W. F. BOILER, Iowa City.

It has been a difficult thing for me to satisfactorily resect the upper portion of the nasal septum when it is thickened or deflected high up in a narrow nose. It has always been difficult to find an instrument that would cut cleanly and quickly without danger of tearing or cutting the mucous membrane.

About a year ago, Mr. C. R. Storz, of Indianapolis, conferred with me on this subject and the results of our conference and experimentation was the construction of a small, hollow, trephine-like instrument which cuts bone and cartilage quickly, cleanly and with minimum amount of traumatism and no danger of fracture of the cribriform plate at any stage of the operation. In my hands this instrument has shortened the time of a submucous resection at least 15 to 30 minutes. The instrument is simply a trephine blade which fits smoothly in a cannula, at the distal end of which is a cleft designed to slip onto the septum under the mucous membrane. The technique of its use is as follows:

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The ordinary steps of a submucous are taken, the mucous membrane elevated on each side of the septum. The vertical cut through the septum is made as far anterior as desirable and extends as high as is possible to go in order to be above the thickening or deflection of the septum. The trephine blade is then slipped back from the distal end of the instrument and the cannula is inserted into the nose astride the septum and parallel with the bridge of the nose between the mucous membrane walls. In this position the cannula is pushed home as far as the slit will allow it to go. It is steadied with one hand and the milled head of the trephine blade is rotated with the thumb and first finger of the other hand, very much as we wind our watch, and at the same time pushed back to engage the cartilage and bone. This results in a rapid, sharp, clean cut in the septum. A small tongue of bone is engaged within the trephine opening of the blade. This breaks off when the trephine is removed and is pushed out of the blade with the obturator. If one cut is not sufficient to loosen the top of the septum, the anterior portion of the septum which is freed by the cut, is removed by the ordinary method and the operation is repeated.

The results of this technique is a clean cut at the top of the septum with no trauma or bruising of the membrane or periosteum. The results are a quickly healing septal wound and a minimum amount of septal inflammation.

This instrument may be made in several sizes, although to date I have not found it necessary to use more than one size. The instrument is manufactured by Storz & Co., Indianapolis, and is advertised on page 4 of this issue.

Iowa State University.

ANALOGY BETWEEN CHOLESTEATOMA AND SKIN CANCER.*

DR. JOSEPH FISCHER, Vienna, Austria.

The etiology of cholesteatoma has not yet been cleared up. It has long been a point of dispute among otologists whether cholesteatoma should be identified with the primary tumors which, according to Virchow, are related to atheroma and dermoid, or rather with that group of branchiogenous cystoma described by Küster. Link assumes congenital etiological factors for cholesteatoma on the basis of elastic fibres and peripheral membrane formation in the matrix, with the absence of inflammatory factors in otoscopic findings and anamnesis. I wish to state that I succeeded in discovering elastic fibres in substantiated cases of secondary cholesteatoma and that, on the other hand, anamnesis cannot be accepted as a plausible argument. Primary cholesteatoma assuredly exists yet is very rarely observed. It is usually located near the dural lining membrane of the internal meatus. Its actual growth results in pressure atrophy of the bone and secondary atrophic degeneration of the nerve. However, this primary cholesteatoma is far less frequently observed by the otologist than the more common secondary cholesteatoma caused by chronic middle ear suppuration. Trötsch, Wendt, Uffeporde and others assumed that the pressure of the pus brought about epithelial metaplasia of the mucosa of the middle ear with subsequent inflammatory desquamation and the formation of cholesteatoma pearls. Theoretically such a type of metaplasia undoubtedly exists. Yet large series of cholesteatoma sections examined over a number of years never exhibited this metaplasia. They showed rather plainly and uniformly that, according to Habermann's earlier description, the epidermis of the external meatus invades the middle ear through the perforation of the membrane (usually we have before us marginal perforation). According to Manasse this inward growth is found only with large perforations, while in other cases near the perforation pavement epithelium grows into the sound tympanic membrane, forming thick protuberances traversing the propria and detaching the mucosa. Continued proliferation then produced a round body (cholesteatoma pearl), which is at first solid and later becomes hol-

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low. He therefore regarded cholesteatoma as an implantation tumor. Isolated cholesteatoma of the mastoid cells, described by Leutert, is assumed to have similarly arisen.

I am of the opinion that the pathogenesis of cholesteatoma is not sufficiently explained by our knowledge of its histopathology. We should study in addition its physiological and biological or rather microchemical processes. How else can we explain histologically that in some cases the inward growth of the epidermis from the external meatus results in epithelization or perfect healing, and in other cases produces cholesteatoma, or—as we shall see—carcinoma. The physiologic processes of dermic growth are characterized by two symptoms: 1. Its marked ability to proliferation; and 2. its tendency to surface growth, which is not surprising when we remember that we have before us protective epithelium. This physiological growth tendency is familiar to us and we make clinical use of it, for instance, in radical operations where we cover the surgical wound with a skin flap in the expectation of thus stimulating epithelization and achieving ultimate recovery. Thiersch's method of epidermic graft after radical operations has the same objective. From clinical experience we know it is not even essential in such cases that the entire graft should take; frequently a large portion of it necroses, yet a few small portions which take are sufficient to effect all around epithelization.

The pathological change arises only after the protective epithelium has lost its physiologic ability to proliferate and grows downward. In this event digitate protuberances develop, so-called atypical epithelial formation, followed by the misplacement of the protective epithelium into the basal connective tissue, so-called epithelial heterotopia. In examining these sections under more powerful magnification their close resemblance to early pavement carcinoma is striking. The resemblance increases the more the above described epithelial protuberances and islands invade the deeper tissues, particularly after concentric layers have formed of pavement epithelium exhibiting beginning or completed cornification in central direction. This resemblance is expressed by designating the lamellar bodies in cholesteatoma as cholesteatoma pearls and in carcinoma as cancrioid pearls.

We inquire next: What causes the loss of the physiologic surface growth of the protective epithelium and its migration to deeper tissues? Why does cholesteatoma result in one case and carcinoma in another? What is the cause of this pathologic growth tendency? Histopathology does not satisfactorily explain these problems. In these growth anomalies we have before us microbiobiochemical cell

processes. According to Cermak three factors are chiefly involved in the physiological growth process: 1. The endocrines; 2. the nervous system; and 3. the individual cell with its own growth energy. The undisturbed functioning of all three factors produces physiological or surface growth. Pathological growth results from disturbance of one of these factors. Disturbances may become manifest as incitation or transmission of the stimuli regulating growth. Or the cell itself may change, for instance, in its ability to sensory receptivity. Orth considered the transformation of epithelial into carcinoma cells the result of a long developmental series of progressive changes in the epithelial cell caused by injury of the cell's own inhibitory mechanism, with subsequently enormously increased ability of the epithelium to growth and proliferation.

For a clearer interpretation of these hypotheses I would like to recount the studies on the production of experimental carcinoma, or so-called tar carcinoma. The first experiments gave negative results. Only chronic dermatitis and hyperkeratosis were established in animal experimentation. Microscopically the sections demonstrated atypical epithelial formation and epithelial heterotopia. In later experiments continuous and prolonged tar painting produced typical skin lesions. How shall we explain this? The tar paintings produce persistent slight tissue lesions of the protective epithelium which the organism tends to heal. Since regenerative processes remain, according to Sternberg, for a long time within normal limits, the above persistently prolonged slight tissue lesions later stimulate regenerative ability beyond physiological limits. Of course, the insults should be accurately graded (B. Fischer), else the tissues are too severely injured and necrose, or induced regeneration is too weak, so that nothing happens.

Thus the stimulus required must be of a definite intensity and prolonged duration. The inherent inhibitory mechanism of the cell is injured only by repeatedly stimulated regeneration which produces irregular downward proliferation. Consequently the protective epithelium loses its physiologic growth tendency and produces atypical epithelial formation and epithelial heterotopia. So long as there was sufficient space growth occurred. In the deeper tissues concentric epithelial formation resulted as cholesteatoma or canceroid pearls, respectively.

For the etiological factor tar in artificially produced carcinoma we substitute chronic middle ear suppuration in cholesteatoma, or rather carcinoma of the ear. It represents the chronic persistent stimulus

of graded intensity, neither too severe nor too weak, if we would produce downward growth.

Up to this point both processes are identical. Both in cholesteatoma as in carcinoma chronic, slight, prolonged tissue insults with subsequent cell regeneration are requisite. Both processes first produce atypical epithelial formation and epithelial heteropia associated with the formation of epithelial pearls showing central cornification. Their further progress differs, however. Carcinoma exhibits asymmetric and pluripolar mitosis, including degeneration and loss of cell chromosomes, displaying greater variety in rapid growth. Cell proliferation in cholesteatoma is succeeded by rapid decay, thus preventing autonomous cell proliferation. The different structures of the dermic pearls can be histologically demonstrated. In cholesteatoma the matrix consists of proliferating living protective, and the other layers consist of dead cornified desquamated epithelium. In carcinoma, on the other hand, almost every layer of the cancrroid pearl shows proliferating, young, more or less immature cells with central cornification only.

Alexander Ohrenklinik, Poliklinik.

SUCTION TONSILLECTOMY—WARING METHOD.*

DR. S. NICHOLAS JACOBS AND DR. LAWRENCE M. TRAUNER,
San Francisco.

In November, 1922, J. B. H. Waring, of Ohio, first described a new procedure in the enucleation of tonsils without preliminary dissection. He elaborated on his method in numerous subsequent articles, describing the technique fully and especially emphasizing its simplicity and unfailing results. His method, to the majority of the profession, was radical and up to the present time he has been almost its sole champion. Although many have probably given it trial, none have commented upon it in the literature except Bailey, who, in February, 1925, reported 35 cases and took exception to most of Waring's conclusions. Since then, however, few besides Waring have advocated tonsillectomy by suction, some even dismissing it entirely as "unscientific," "unproved," etc. The authors, therefore, would like to answer these criticisms, comments and numerous inquiries of the method as used by them at the Sutter Hospital, San Francisco.

The senior author has used the Waring suction apparatus since May, 1924. Our series includes 389 cases. Of these, 351 were performed under local anesthesia, while 38 were under general anesthesia. The technique used in these 389 cases was fundamentally the same as that outlined by Waring. Over the period of time, however, as the adaptability to the technique improved, modifications presented themselves and were added.

TECHNIQUE.

When employing local anesthesia, gagging is abolished by preliminary swabbing of the pharynx, tonsil pillars and base of the tongue with 10 per cent solution of cocain. This is done in clear view, using the head lamp and a wide-base tongue depressor. After all gagging has been controlled, the Cameron mouth gag, modified by ourselves and carrying its light, is inserted. The tongue is kept down in position by using a wide-base tongue depressor, so held by the assistant or the nurse that a full, unobstructed view of the tonsillar fossa is obtained. One-half per cent novocain is then injected into *a.* the supratonsillar fossa, *b.* between the tonsil and

*From the Sutter Hospital, San Francisco.

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the posterior pillar, *c.* between the tonsil and the anterior pillar, and *d.* in the lower border of the fossa at the base of the tongue, on both sides. The tonsil is now ready for enucleation. If general anesthesia is to be used, this preliminary preparation is obviously unnecessary, the technique of enucleation being otherwise the same.

The tubes used are similar to those described by Waring. They are of blown glass, a rounded bulb with a long stem. The oval opening which is placed over the tonsil varies in its long diameter from $\frac{1}{2}$ -inch to 1-inch and in its short diameter from $\frac{1}{4}$ -inch to $\frac{5}{8}$ -inch, the sizes being numbered arbitrarily from one to eight.

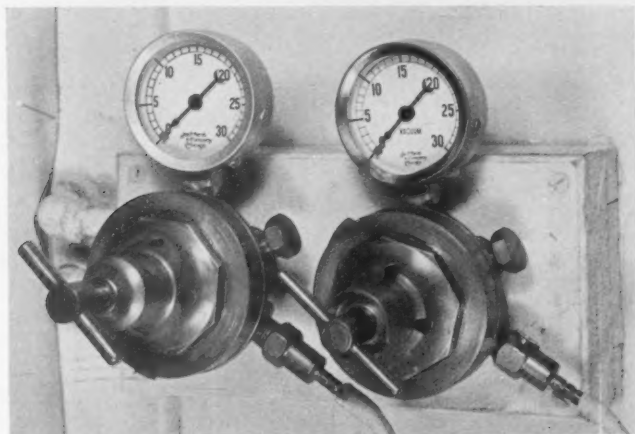


Fig. 1. Vacuum gauge (on the right) with specially constructed valve of diaphragm type, by which vacuum can be gradually increased and maintained at desired level. Compressed air gauge on left.

The size of the tonsil can easily be estimated under clear vision and the smallest tube which will admit the entire tonsil is selected. Snares threaded with No. 9 piano wire (which is somewhat heavier than that ordinarily used) are so shaped that the loop may just clear the bulb in either diameter when passed over it. The wire loop is placed over the tube and held loosely. The bulb of the tube is then placed over the tonsil while retracting the anterior pillar, the stem of the tube having been previously connected to the suction pipe by means of rubber tubing. By means of a specially constructed valve, the suction is started and increased gradually, in the average case, up to 15 inches of vacuum, as shown on the

gauge. If dense peritonsillar adhesions are present, it will be necessary to increase the suction, at times bringing it up to 25 inches of vacuum. It is especially to be noted in this connection, that insufficient suction has been the principal cause of failure in this method of enucleation. The tonsil will be seen to be gradually drawn out of its fossa into the glass bulb. Manipulation with the pillar retractor at the upper and lower poles will insure complete entrance of the entire tonsil into the tube and show the pillars to be free. After close inspection, the wire snare is brought over the bulb of the tube and slid down toward the base of the tonsil, and while so doing it is gradually closed at the same time. It slides easily over the edge of the tube because of the tapering of the glass bulb.

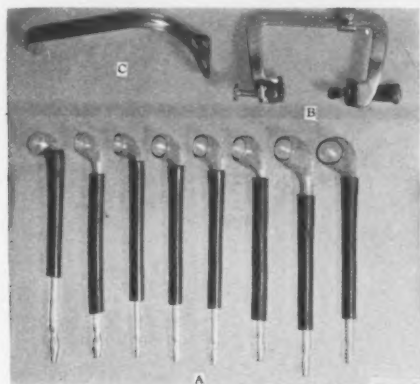


Fig. 2. (A) Glass suction tubes from sizes 1 to 8, reading from left to right. Note tapering, oval openings in the bulb. Stems covered with rubber tubing. (B) Cameron mouth gag carrying its own light, modified by authors with set screw in the upper arm which fits into the perforations in the lower arm. This absolutely prevents slipping. (C) Tongue depressor with broad base, giving better exposure of tonsillar fossae.

Further closure of the snare then dissects out the base of the tonsil, the wire automatically passing through the connective tissue between the fibrous capsule and the pharyngeal aponeurosis. The tonsil, intact in its capsule, is thus shelled out of its fossa and is sucked up into the tube. With the tonsil out, a sponge may be inserted in the fossa and held for a few minutes to stop any oozing from the base.

COMMENT.

If the technique is followed out as outlined above, it will be found as Waring described it—simple. The important details to keep in

mind are: First, to get the correct size tube for the tonsil; second, to apply the tube so as to include the entire tonsil and exclude the pillars from within the bulb; third, to slide the wire loop over the bulb and down to the base of the tonsil, gradually closing it at the same time. If close attention is paid to these details, the tonsil is shelled out from its fossa with its capsule intact and all infectious material is removed from the operative field.

The claim that an assistant is needed is of no consequence as a nurse can very quickly be taught how to retract the tongue. Dexterity will come with practice, as in any other procedure in surgery. But aside from its simplicity, the method has other, more distinct and important advantages.

Theoretically, tonsillectomy by preliminary dissection aims to remove the entire tonsil intact, with the least amount of hemorrhage. This it often fails to do. The capsule is often so intimately associated with the underlying aponeurosis that it is impossible to separate the two by means of a knife. What usually results is that the knife gets into the fascia and opens many bleeders, or else it gets into the tonsil tissue proper, so that the fibrous capsule is left in the fossa. With the suction method, however, there is no possibility of getting into the tonsil tissue as the capsule is drawn up into the tube. As for opening bleeders, this is a rare complication, as the wire cannot enter the aponeurosis. If, as is sometimes the case, the vessels lie superficial, their outer adventitial coat may be scraped. We have often exposed superficial vessels lying at the base of the fossa, from which the capsule had been peeled, but they had not been damaged. Had dissection been used in these cases, hemorrhage would have been inevitable.

Another outstanding advantage of the method is the instantaneous removal of infectious material from the operative field. The very moment that suction is applied, all pus or other infectious material is immediately sucked up into the tube and cannot possibly get into the pharynx or larynx. This is not the case in the dissection method, even where suction is used for clearing the field while the dissection is carried out. The moment that the tonsil is grasped by the tenaculum, pus is squeezed out and is either swallowed or inspired. This is impossible with the suction method, consequently lung abscess or postoperative pneumonia is unheard of. Again, if a sponge is inserted at once into the recently evacuated fossa, no free bleeding is seen. In our experience of 389 cases, we have had to insert a suture in but one case, and in three cases placed string sponges in the fossa for 15 minutes to control any oozing.

All the other cases had no excessive oozing and when the patient left the table both fossae were absolutely dry.

As the method is comparatively bloodless, the entire operation is in full view. In this we are greatly aided by use of the Cameron mouth gag, which carries its own light, the field being continuously brightly illuminated. Such illumination cannot be obtained with the head lamp. If ordinary precaution is exercised in selecting the appropriate size of tube for the tonsil and in properly applying the tube, it is impossible to include any other structure but the tonsil. We do not think it possible to "button-hole" either pillar by this method, and only by the most inexcusable carelessness can the uvula be damaged.

Due to the comparatively insignificant amount of trauma, the convalescent period is markedly shortened. The pillars are left clean and smooth, while the aponeurosis on the floor of the fossa remains intact and scarless. Healing is often complete and the patient is eating his usual diet within three to five days after operation. In a number of instances, patients have eaten a full diet within 12 hours postoperatively.

CONCLUSIONS.

1. Tonsillectomy by the suction method is a comparatively simple operation, but the technique must be carefully acquired through practice, as in any other surgical procedure.
2. Suction tonsillectomy removes the entire tonsil within its capsule without damage to the surrounding tissues or with a very minimum amount of trauma.
3. Enucleation by this method is, in the vast majority of instances, comparatively bloodless.
4. All infectious material is completely removed by the suction, so that the danger of postoperative lung abscess or pneumonia is eliminated.

Suction tubes are manufactured by the Mim Company, of Wilmington, Ohio, whose advertisement of them is carried on page 5 of THE LARYNGOSCOPE.

REFERENCES.

- WARING, J. B. H.: *Virginia Med. Monthly*, 49:472-474, Nov., 1922; *Ann. Otol., Rhinol. and Laryngol.*, 32:913-921, Sept., 1923; *THE LARYNGOSCOPE*, 33:587-595, Aug., 1923; *Med. Jour and Rec. (supp.)*, 119:13-15, Feb. 6, 1924; *Med. Progress*, 44:276-280, Dec., 1928; *Interna. Jour. Med. and Surg.*, 42:80-85, Feb., 1929; *Arch. Physical Therapy*, 9:544-548, Dec., 1928.
- BAILEY, F. W.: *THE LARYNGOSCOPE*, 35:161-164, Feb. 1925.

1065 Sutter Street.

DEATH FROM RECTAL ANESTHESIA IN LARYNGECTOMY.

DR. FREDERICK T. HILL, Waterville, Me.

MacKenty considers rectal anesthesia for total laryngectomy dangerous. Referring to the dose he says, "If large enough to produce complete anesthesia, it may carry the patient too close to the lethal border." The following case is reported as an anesthetic death resulting from the use of a rectal ether for laryngectomy. In this case it was not intended to use a complete rectal anesthesia but rather a rectal analgesia, to fortify the combined anesthesia described by MacKenty. This was given by an anesthetist thoroughly trained in its use, who had administered this form of analgesia for the writer in a large number of cases, other than laryngectomy. The first mistake in this case was not doing a preliminary tracheotomy. There had been embarrassed respiration due to impairment of the laryngeal airway but this had subsided considerably under X-ray therapy, so that the obstruction was not noticeable in the patient's breathing. Of course any obstruction to the airway would make this form of anesthesia especially hazardous. Ether, absorbed from the rectum into the circulation, is excreted through the lungs. Any obstructive lesion may cause rebreathing with a deeper narcosis, a similar effect to that produced intentionally by covering the face with a moist towel when not deep enough. The depressed respiration due to the preliminary medications favored this rebreathing.

Case Report: E. C., a male, age 64 years, was referred by his physician with a history of hoarseness for many years, increasing the past year, and some difficulty in breathing. This had become much worse the past few months. No dysphagia. Denied venereal disease. Otherwise in good general health.

Patient was a large man, weighing about 200 pounds. He was almost aphonic and quite dyspneic on exertion.

Examination showed the whole glottis involved in a cauliflower growth with superficial ulceration, especially in the posterior commissure. The arytenoids were considerably swollen and edematous. Both cords fixed in about the cadaveric position. Epiglottis appeared normal. No palpable cervical nodes. Examination with the laryngeal

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speculum showed considerable subglottic involvement. Roentgenogram of chest normal. Blood and spinal fluid Wassermann negative. *Diagnosis:* Carcinoma.

While waiting for the reports of the laboratory tests the patient was given X-ray therapy by Dr. J. P. Goodrich. Through a misunderstanding the patient was not seen again for several weeks. When he did report for examination there was a marked shrinking in the amount of intraglottic involvement. He was now breathing quite easily and there appeared to be little impairment of the airway, at least as compared to previous findings. This misled us into believing that a one-stage operation could be performed without preliminary tracheotomy. Unfortunately direct examination, which might have shown a different picture, was not done again at this time.



Larynx split open. Looking anteriorly.

Patient was hospitalized under the care of an internist for several days in preparation for operation. Blood pressure was 160/90. Heart normal. Lungs clear except for some emphysema. Urine negative.

The following preoperative preparation was carried out: S.S. enema repeated until return was clear. Chloratone suppository with 15 gr. of sol. barbitol was given at 8:15 a. m. Morphin sulphate, gr. $\frac{1}{4}$, at 8:30 a. m., H.M.C., No. 2, at 9:30 a. m. At this time instillation enema of ether, $4\frac{1}{2}$ oz., and olive oil, 6 oz. was given.

When brought to the operating room one hour later he was completely anesthetized so that the intended novocain infiltration was not required. While this was unexpected, the anesthetist considered the patient in safe condition to proceed with the operation. The MacKenty technique was followed and the larynx had been well skeletonized when suddenly the anesthetist became greatly alarmed by the condition of the patient. Respirations had been getting shal-

low and now had ceased. The trachea was quickly opened and oxygen administered. Five hundred c.c. of saline were given intravenously, the contents of the rectum were washed out and the stimulation given, but without effect. While theoretically it is possible to overcome the narcosis by neutralizing the concentration in the blood, it was too deep and too far advanced in this case to be of avail.

Examination of the larynx showed marked involvement of the glottis and subglottic area, arytenoids and arytenoepiglottidean folds. There was also a nodular mass involving the esophageal wall on the right, as well as a large gland just anterior to the cricoid. Pathological examination by Dr. F. L. Mallory showed "epidermoid carcinoma".

This case illustrates that the dangers of a rectal ether may be increased by any obstructive lesion in the laryngeal airway causing rebreathing and deeper narcosis, possibly to the lethal point.

REFERENCE.

MACKENTY: Cancer of the Larynx.

Professional Building.

BOOK REVIEW.

Diseases of the Nose, Throat and Ear (Sixth Edition). A Manual of Diseases of the Nose, Throat and Ear. By E. B. Gleason, M.D., LL.D., Professor of Otology, Graduate School of the University of Pennsylvania. Sixth Edition, Thoroughly Revised. 12mo of 617 pages with 262 illustrations. Philadelphia and London: W. B. Saunders Company, 1929. Cloth \$4.50 net.

This new edition of a well known manual appears with numerous changes and additions which keep it in accord with modern teaching. The author is successful in maintaining a broad point of view in those branches where some difference of opinion exists. The facts are stated in an unarbitrary manner and this allows the reader to judge for himself as to the relative value of what is being discussed.

The smallness of the text combined with the recognized material makes this sixth edition a very useful manual for reference by the otolaryngologist, as well as a very practical textbook for the student. The book should be in the library of everyone interested in otolaryngology. F.

International Digest of Current Otolaryngology.

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I. R. Smith, in the *Canadian Medical Association Journal* for February, 1930, reports on 1,344 cases of nontuberculous pulmonary disease and emphasizes the frequent occurrence of upper respiratory infection, particularly sinusitis, as an etiological factor. He emphasizes the importance of a thorough investigation of the upper respiratory areas in the treatment of pulmonary disease. ROSENBERGER.

Mollison, of London, in the *Brit. Med. Jour.* Dec. 7, 1929, writes on the drug treatment of spasmodic rhinorrhea. Included in this treatment are the nasal manifestations of allergy. Mollison claims that general treatment having to do with the internal secreting glands, as well as allergic treatment, is very often of much benefit. He claims that deficiency of calcium probably predisposes the allergic conditions and for this reason he uses calcium lactate. He has added parathyroid extract and finds that a powder of 15 grains of calcium lactate and 1/10 of a grain of parathyroid extract, given twice a day to his cases of "nasal allergy", has brought him rather startling results.

In *Minnesota Medicine* for April, 1930, Hochfilzer discusses early or late operative treatment in complications of acute otitis media. He believes that in spite of all the technical help available, the correct judgment concerning operative interference depends on personal experience, together with the proper interpretation of clinical findings. Regarding early operations in acute otitis media, he quotes Paul Hopkins, of Berlin, who published statistics of 303 operated cases and who found that the greatest mortality occurred in patients who were operated during the first week following the onset, due probably to the virulence of the infection and the low resistance of the patient. ROSENBERGER.

R. Chobot, of New York, in the *American Journal of Diseases of Children*, 39:241-470, February, 1930, reports on the Incidence of Sinusitis in Asthmatic Children and has observed that in asthmatic children sinus infection is comparatively frequent, 41 of 100 examined having reacted positively. He advises that treatment be conservative, but that puncture and irrigation be carried out when conservative measures fail.

Declaring that 80 per cent of impaired hearing, if detected early, can be prevented or arrested, Moore, in the journal of the Arkansas Medical Society for April, 1930, pleads for a campaign of education and the co-operation of the medical profession, members of school boards and public health authorities.

He urges otologists to pay more attention to the etiological factors in childhood.

ROSENBERGER.

Mr. G. J. Jenkins, before the Royal Society of Medicine, Otological Section, London, in March, 1930, described three cases of malignant disease starting in the region of the descending part of the facial nerve and jugular bulb. A very similar syndrome was presented in each case. Early middle ear deafness was followed by facial paralysis, whilst in the advanced stage the palate and tongue on the same side were paralyzed and a dead labyrinth was found. In one case a red crescent of the tumor could be seen distal to the posterior inferior quadrant of the intact drum. Two cases came to operation, one in 1926 and one in 1927, the tumors were cystic and contained a clear fluid; treatment consisted of wide removal and the insertion of radium. Section of the cyst walls showed a slowly-growing sarcoma. There was still no sign of recurrence. The third case had refused operation and was getting rapidly worse, internal ear deafness was increasing and replacing the original middle ear deafness, the tongue and palate on the same side had recently become paralyzed.

W. S. DAGGETT.

McGivern, of Atlantic City, before the Medical Society of New Jersey, in June, 1928, read a paper on The Diagnosis and Treatment of Maxillary Sinusitis. He claims that the patient may evacuate the contents of a diseased antrum by blowing his nose vigorously, and for this reason he requires his patients to sit quietly without blowing the nose for one hour before antrum lavage. He also boldly assails the use of suction, claiming that he has never seen any good come of it, but has often seen detrimental results.

Writing in the *American Journal of Surgery* for April, 1930, W. D. James recommends the method of coagulation as the operation of choice for the removal of cancer of the lip and buccal mucous membrane. He believes that X-ray and radium therapy should be used subsequently and that surgical dissection is contra-indicated.

ROSENBERGER.

Hajek, of Vienna, as his contribution to the Austrian Society for the Study of Cancer, read a paper, in December, 1929, on "The Results of Combined Operative and Radium Therapy in the Rhinolaryngological Clinic During the Past Ten Years." This paper appears in full in the *Wiener Klinische Wochenschrift*, Dec. 26, 1929. Hajek, with his usual thoroughness, divides the Nose and Throat into anatomical sections and describes clinical results of this combined therapy compared to the results of either one or the other alone. Forty-six cases of nasal malignancy were treated during the past ten years and the end-results in only 10 are obtainable today. These were cured over periods of one to 12 years. He discusses cases embracing all regions of the nose and throat and gives a frank exposé of what has been accomplished along these lines in the Hajek Clinic. Hajek believes that by this combined surgical and radium therapy the best advances may be expected against the cancer problem, but he is not at all enthusiastic about the results that have as yet been recorded on the problem.

In the *Illinois Medical Journal* for April, 1930, Cottle again calls attention to the frequency of obscure ear disease in the first year of life. Postmortem head examinations in a series of nine patients dying from intestinal intoxication revealed unexpected middle ear or mastoid suppuration in six.

ROSENBERGER.

The National Academy of Medicine announces its Third Annual Fortnight, Oct. 10-31, 1930. The general subject which has been chosen for this year is Medical and Surgical Aspects of Acute Bacterial Infections. Many of the items on the program will be of extreme interest to the otolaryngologist, and special clinics and demonstrations have been arranged in the various groups. The profession generally is invited to attend and no fees will be charged for attendance at any of the clinics or meetings. Complete program and registration blank will be mailed on request.

The Budapest Heilpädagogischen und Psychologischen Laboratoriums recently celebrated its twenty-fifth anniversary, and a special book was published under the direction of Professor Ransburg. Many interesting articles appeared in this volume, among which was one by Philip Michels concerning the relative standing of education of the deaf child. The conclusion is reached that the education of the deaf and dumb child is still far behind that of the blind. Michels accounts for this by the fact that the deaf and dumb child must first of all be made to understand the spoken word, and then comes the added difficulty of making him reproduce that sound.

Another interesting article in the same volume is one by Josef Vertes on "The Memory of Deaf and Dumb Children." He experimented with 69 school children and found that the deaf and dumb child has not as good a memory for figures and foreign words as the normal child. The handicapped child can more readily point out indicated words on the blackboard than the normal child. Memory for objects seems to be about the same in both groups. KELEMEN.

In the journal of the Michigan State Medical Society for April, 1930, Wilkinson reports a study of 332 operated cases of chronic maxillary sinusitis.

In this series the surprisingly low figure of 3 per cent were believed due to dental infection. The chief symptom was nasal or postnasal discharge.

The Caldwell-Luc was the operation of choice, being performed in 271 cases. Of these, 121 cases had polypi or marked polypoid mucous membrane. ROSENBERGER.

Otology in children is ably presented by Freund in the *Medical Journal and Record* for April, 1930. Appropriate stress is laid on the anatomical differences between the adult and infantile types and the clinical importance of these variations. ROSENBERGER.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Meeting of Nov. 20, 1929.

DR. J. D. WHITHAM: In connection with this programme on "Nerve Block" I thought it would be interesting to present the three cases of headache I have selected: the first case, tic douloureux, preceded and accompanied with severe nasal sinus infection; the second case having tic douloureux, unaccompanied with sinus disease; and the third case, pressure headache of the type so often seen by the rhinologist.

Case 1. Tic Douloureux for Two Years: Charles C., age 79 years, was first seen Jan. 7, 1927. In 1925 he had begun to have frequent attacks of severe pain of a spasmodic type, involving the upper jaw, upper teeth, and, to a slight degree, the supraorbital region; the attacks were of about six weeks' duration and of frequent recurrence. For several years he had had an annoying postnasal discharge and some difficulty in breathing through the left side of his nose. He was referred to me with the information that some polypi had recently been removed from the left side of the nose, and a bloody nonpurulent return had been obtained on washing the left antrum.

The patient, a fairly robust old man, showed a typical tic douloureux involving the second and, to a lesser degree, the first division of the trigeminal nerve. The lightest touch to his moustache or to the left side of the face was sufficient to bring on a pitiful spasm of pain. Transillumination and X-rays showed a severe involvement of the left antrum. The left middle meatus showed many small polypi. There was on tendency to nosebleed. Although the symptoms were typical of a tic douloureux, the rhinological findings pointed to a malignant growth of the left antrum. With this idea in mind, a radical antrum operation was done on Jan. 11 at the Manhattan Eye, Ear and Throat Hospital. The antral mucous membrane was thickened and polypoid, almost filling the antrum; the cavity contained a watery fluid. The antrum was completely cleared, and the ethmoid cells and polyps were removed through the transantral route. No evidence of malignancy was found. About six minims of an alcoholic mixture was injected into the infraorbital foramen. The mixture used was novocain 1, chloroform 2, alcohol 35, water 12. The infraorbital nerve was grasped by a hemostat, and about half-an-inch was removed by evulsion. The operation was done under nerve block anesthetic, preceded by morphin and scopolamin. Leaving the hospital on the fourth day, the patient made a complete recovery and had no recurrence of pain until May 1, 1927. The pain at that time was in the distribution of the malar and posterior superior alveolar branches. A few drops of alcohol were injected into those branches. The result to date—almost three years—has been a complete relief of pain in this region. Six months ago he had a slight pain in the supraorbital nerve which was injected and has since remained quiescent.

The alcoholic injections were always preceded by novocain injections and were not very painful. They were given in the office.

That sinusitis can be a cause of tic douloureux is denied by most observers. The coincidence of the infected antrum and the infraorbital neuralgia is too well marked in this case to be ignored.

Case 2. Tic Douloureux for Four Years: Mrs. K., age 41 years, was referred to me in May, 1926, by Dr. F. M. Block. She stated that for about four years she had suffered from neuralgic pains in the left side of her face. She referred all her pain to the distribution of the superior maxillary branch of the trifacial nerve. A slight pinch of the skin of the left cheek brought on a typical attack of tic douloureux. An alcohol injection of one-half c.c. was made at once by the external route, striking the main branch of the nerve at its exit from the skull at the foramen rotundum. This patient experienced

severe pain and suffered for about 24 hours. Since that date (three years ago) she has been free from pain.

Case 3. Sluder Syndrome, Upper Half; Headache for 25 Years: M. A., a governess, age 41 years, was first seen in May, 1922, at the Manhattan Eye, Ear and Throat Hospital, on the service of Dr. Samuel McCullagh. She told me that for 25 years she had had some headache nearly every day. Correction of her eyes had not given relief. The pain was chiefly in the left parietal and occipital regions, and centered at times in the left mastoid. X-ray examination of the sinuses showed no marked pathology. The Wassermann reaction was negative, as was the examination of the urine. The ear, nose and throat were negative except for a well-marked vomerine spur posteriorly and a high cartilaginous deviation. These abnormalities made it difficult to pass a probe to the sphenoidal face. Cocainization of Meckel's ganglion seemed to relieve her pain. A submucous resection carried high up and well back relieved the pressure, and the patient states that for the seven years since she has been free of pain.

DISCUSSION.

DR. WILLIAM W. CARTER: I think that a series of such important cases as this should not be allowed to pass by undiscussed. I have just come in, and have not had the opportunity to think over the number of tic douloureux cases I have had, but I heard from one only yesterday, and it was so fresh in my mind I thought it might be of some value in connection with the cases just reported. Six months ago a woman, age 52 years, came under my observation, who had excruciating pain over the area of distribution of the infraorbital nerve on the left side, which had lasted for seven years. She was terribly emaciated and was suffering so much that she threatened to commit suicide. I first injected novocain, and then 95 per cent alcohol into the nerve in the infraorbital canal. She had a very severe reaction from the injection, but when she recovered from the first reaction, the pain disappeared completely and she remained well for several months. I felt very much encouraged, and thought I had cured the woman. Day before yesterday, however, her daughter called me up and told me the pain had returned. The question in my mind is whether we should first try the alcohol and then if it is not effective, resect a portion of the nerve, or whether the latter method should have precedence. I should judge from what the doctor has just said that these symptoms recur even after resection of the nerve. The disease is of such a severe character, and it is so protean that any method that could be devised to completely cure it would add greatly to the attainments of the profession.

DR. J. I. KLEPPER: A little more than a year ago a patient who had been suffering with tic douloureux for three years came to me. Before performing an antrum operation, it was decided to have an X-ray examination of the sinuses and teeth. The presence of an abscess seemed likely. The reports were negative. Still feeling that the absence of an abscess had not been definitely established, X-ray pictures were again taken; this time the reports revealed an impacted tooth, which was the cause of the extended neuralgia. Removal of the tooth brought relief to the patient. It is very interesting here, as in other cases that impacted teeth cause neuralgia far from the origin. Tic douloureux should always be investigated in this direction as to cause and relief.

Another patient with tic douloureux, referred to us by a New Jersey physician, was treated with injections of novocain and alcohol. Temporary relief followed; the tic diminished with every injection of the infraorbital and zygomatic nerve. The family physician was shown how to use this treatment, and has since reported improvement. As the patient has not returned to our care, we assume that he is still improving. In this case, as in others, resection of the nerve should be a last resort.

DR. WHITHAM (closing the discussion): I think there are very few cases of tic douloureux which should be trifled with very much. A second injection might be tried, but in nearly all it would be more humane to have the sensory root sectioned. My first case, the old man of 80 years, did not look like a particularly good risk for a surgical operation, and I suspected a tumor of his antrum, which was my excuse for not sending him at once to a neuro-

surgeon and having the Gasserian ganglion operated on. The new operation on the Gasserian ganglion, which cuts the outer two-thirds of the sensory root, is so much better than the old operation that we ought not to trifle with these cases for long. The section of the outer two-thirds of the sensory root has been highly satisfactory. By not sectioning the entire root, sensation in the eye is preserved. When you section the whole root, you have trophic disturbances in the eye, but the new operation avoids that. I do not think there are many cases of this type we should treat ourselves.

DR. LOUIS GASTON LABAT (by invitation): Cases of true tic douloureux, also called trifacial neuralgia, are of frequent observation, but many more cases that do not belong to the usual group are seen in our office. The case just presented by Dr. Whitham was one in which the antrum was infected. I see many of this type. In these cases one is justified in attempting to remove the cause which produces the neuralgia before injecting the nerve. Occasionally, if the pain is severe the reverse seems desirable. While alcohol gives very good results, it is said that evulsion of the nerve is a better procedure. My experience in one case of evulsion, in 1922, is the following: I was called to see a case of tic douloureux of the second division. The infra-orbital nerve had been surgically removed at Bellevue, according to the report which I received before making the injection. The patient was still suffering from the same tic douloureux of which he had complained before, radiating toward the upper lip. I remember it was on the right side with pain shooting towards the upper lip, the ala of the nose and lower eyelid. Instead of injecting the infraorbital nerve in the infraorbital canal, I injected the maxillary nerve in the sphenomaxillary fossa. In this particular case I found it was necessary not only to deposit the alcohol in the fossa, but to reach the nerve and, in fact, traumatize it by repeated punctures. The patient has since been free from pain. It is a very painful procedure but can be and is actually done in the office. Two or three minutes after the injection of alcohol there is absolute relief, and the patient leaves the office in good condition. I do not think we ought to abandon the method of injecting alcohol into the infra-orbital canal and try to evulse the nerve, thinking that it is a better procedure. If done correctly the injection takes effect. Occasionally we find that the needle does not enter the infraorbital canal very well. The bone in this region may be so thin as to be easily pierced if too much force is applied to the needle when making contact with the bone. It is therefore necessary to be very gentle and use a very thin needle, trying to pass the needle into the canal about 1 c.m. deeper than the foramen and then make the injection. I have never seen one of these injections fail when 1 c.c. of pure alcohol is injected into the canal.

Ocular Motor Paralysis. Dr. Robert Murphy.

This patient, male, age 32 years, was admitted to the Out-Patient Department of the Manhattan Eye, Ear and Throat Hospital on Sept. 16, 1929, complaining of inability to open his left eye. He said that on Aug. 29, when he awoke he found that he could not lift the left lid fully and that by Sept. 5 the lid was fully ptosed, having dropped gradually and had remained down since that day.

On examination, the muscles of the left eye, with the exception of the superior oblique and external rectus, were found to be paralyzed. The pupil reacted to light and accommodation. Wassermann and Kahn tests were made and reported negative. Urine examination was negative.

Report of X-ray examination of sinuses, on Oct. 23, shows: Left front minute in size, showing no pathology; right frontal absent; left ethmoid shows slight involvement with marked edema and absorption of cell walls; right ethmoid shows moderate involvement with marked edema of cell walls; left antrum shows slight involvement, while right antrum and the sphenoids are negative.

Patient was referred to throat department for nasal treatment.

A further questioning of the patient elicited the fact that he had contracted lues while in the army in 1919, at which time his Wassermann report was only 2 plus (xx). He was treated with salvarsan and mercury then, and again in 1921 while in the employ of the Detroit Health Department.

Five Wassermann reports in the interim have all been negative. A provocative Wassermann was taken, along with a Kahn test, on Nov. 4, with a negative result.

On Nov. 13, nasal mucosa was shrunk with cocain and adrenalin, and suction applied with no return of mucus or pus.

Report of X-ray of sinuses on this date shows practically no change from previous report.

Since injection of salvarsan on Nov. 4, patient has been able to open the eye slightly. He is now receiving antiluetic treatment.

The patient has not had headaches of any kind, nor any nasal symptoms, still his X-ray reports show the presence of pathology in his sinuses. Of what value is this X-ray report? According to the laboratory, this patient is a cured luetic suffering with sinusitis, while clinically he is neurosyphilitic without sinus disease.

DISCUSSION.

DR. E. M. JOSEPHSON: Case of paralysis of oculomotor nerve, sinusitis or syphilis? The case is undoubtedly one of neurorecidival syphilis, probably due to insufficient treatment. The fact that the Wassermann reaction is negative is a commonplace affair to those who handle syphilis extensively. The only adequate test in such cases is the therapeutic test, and even that does not eliminate the possibility of syphilis if there be failure of response. As it so happened in this case, salvarsan administered for the purpose of eliciting a provocative Wassermann revealed the true nature of the ailment, by the response and clearing up of the ptosis.

I reported a similar case in the literature in an article entitled, "Vascular Changes in Chronic Progressive Deafness," *THE LARYNGOSCOPE*, 1929. The patient presented involvement of the right oculomotor and trochlear nerves with complete paralysis of the nerves involved, facial paralysis and hypoglossal paralysis, as well as subtotal deafness of right ear, as well as involvement of the right vestibular nerve. The onset had been gradual over a period of two months. He had had syphilis some eight years prior, which had been inadequately treated with two courses of salvarsan and mercury or bismuth. The condition cleared up rapidly under antiluetic treatment.

DR. JULIUS I. KLEPPER: I know this case. I saw the patient when he first presented himself in the clinic and we made the diagnosis of oculomotor paralysis. We immediately suspected lues and ordered a Wassermann test, which was reported negative. The patient would not confess the presence of lues until seen afterward by Dr. Murphy. I congratulate Dr. Murphy on his power of persuasion. The man seems somewhat improved now and I am sure he will improve more under luetic treatment, provided other causes have been eliminated.

Abstract of the Case of C. C. Dr. Leahy.

Age 35 years, married, tailor by occupation. Admitted to hospital April 20, 1929. Discharged June 17, 1929.

Chief Complaint: Difficulty in breathing, swallowing and speaking and tightness in the region of neck and throat. Family History: Negative. Father died of influenza, 1919. Personal History: Has averaged 150 pounds. Habits regular. No alcohol. Uses little tobacco. Had whooping cough and what was thought to be typhoid fever during childhood.

Present Illness: In October, 1928, patient stated that he had a drooping of left eyelid, which came on suddenly and lasted $2\frac{1}{2}$ months. In December, 1928, he began to experience a tightness in the region of the neck, which gradually became worse, until patient found it difficult to breathe. About February, 1929, he began to have trouble in speaking and gradually found that all words were difficult. On admission he had marked difficulty in expressing himself. He had dyspnea due to the tight feeling in neck and also had trouble in swallowing food. Was unable to take a sip of water because couldn't swallow it. Had difficulty in clearing his throat of mucus. Patient also complained of stiffness of right arm and forearm and said that grip on this side was weak.

Physical Examination: Adult male, age 35 years. Acutely ill. Seemed to be in distress. Slight cyanosis of face. Speech was of bulbar type. Pupils dilated, reacted sluggishly to light. There was a ptosis of left upper eyelid. Ocular movements intact. Eye grounds negative. There was a bilateral weakness of movement of palate, especially marked on the right side. Sensation of palate and pharynx normal. No paralysis of tongue or lips. Slight increase in deep reflexes on left side. No paresis of extremities. No pathological reflexes elicited. Speech was very difficult and he became quite exhausted when trying to talk. He had great difficulty in swallowing solids and regurgitated liquids through nose.

Throat Examination: Will be given by Dr. Lore.

Urinalysis: Showed specific gravity 1036 and moderate amount of albumin, with occasional hyaline and finely granulated casts, but this condition cleared up on subsequent examinations.

Blood Count: Showed a leukocytosis of 14,450; polys., 56 per cent; 28 per cent large lymphocytes, and 16 per cent small lymphocytes.

Blood Chemistry: Showed at first N.P.N. of 49.5; urea nitrogen, 25, and blood sugar, 153. Subsequent examination showed N.P.N. 40.5; urea nitrogen, 18.5; and blood sugar, 125. Wassermann was negative.

Patient stated he has seen the examiner some time previously at the Neurological Institute and an abstract from there showed that he was admitted there Nov. 19, 1928, and discharged Nov. 20, 1928. There he gave a history of an acute illness with chills on Oct. 15, and a week later had a severe generalized headache with drooping of left upper lid. No other symptoms. Later he had a slight weakness of right upper lid also.

Physical Examination at Neurological: Showed the palpebral fissures narrow on both sides, greater on left. Paralysis of left upper lid and paresis of right upper lid. There was a limitation of movements of left eye in convergence and lateral excursion of both eyes. Also lower right facial weakness.

Spinal Fluid at Neurological: Showed no cells, negative globulin; Wassermann and colloidal gold, 19 m.g. of protein.

Diagnosis there: Epidemic encephalitis.

Patient improved. He was given 20 gr. of sodium salicylate daily intravenously. Later this was increased to 30 gr. He was given 10 doses in all. He improved very much and was able to eat his regular diet. Was able to swallow water slowly without regurgitation. He was discharged as improved.

His temperature varied here rectally from 99° to 101½°. This lasted for three days and after that was practically normal.

This patient was readmitted to the hospital on Sept. 14, 1929, again complaining of difficulty in swallowing and speaking. He was admitted because of a pain in right lower quadrant, followed by vomiting. He also complained of pain in the lower back, which radiated to both sides. There was no pathology found in abdomen or in back.

There was no temperature. Re-examination on Sept. 30, 1929, confirmed the original diagnosis and he showed residuals of epidemic encephalitis with paralysis of palate, larynx and pharynx. A note by Dr. Lore on Oct. 2 showed that the condition was practically the same and he had a paralysis of soft palate and some anesthesia. Loss of pharyngeal reflex. Larynx normal.

Summary: A male patient, age 35 years, in which the illness developed suddenly, with ocular paralyses. Four months later, an acute bulbar syndrome developed, in which speech and swallowing were involved. There was also a weakness in the right upper extremity. Later, swallowing and speech improved but patient had exacerbations of this difficulty.

Because of acute onset with slight fever, ocular symptoms and acute bulbar syndrome with absence of marked leukocytosis, and marked increase of lymphocytes in spinal fluid, with rest of serological picture negative, a diagnosis of epidemic encephalitis was made.

Abstract of the Case of S. P. Dr. Leahy.

Age 28 years. Admitted Dec. 2, 1928. Discharged May 29, 1929. Chief Complaint: Aphonia and difficulty in breathing. Family History: Negative. Personal History: Diphtheria in childhood. Influenza in 1918. Operated

for hypertrophic ethmoiditis. Also tonsillectomy and adenoidectomy. About 10 days prior to admission she was treated by Dr. Lore for a sinus condition. He punctured left antrum of Highmore. This was followed by moderate malaise, feverish reaction and pain about the face. Two days later, she suddenly became aphonic and embarrassed in respirations, so much so that she was sent to the hospital, where a tracheotomy was done immediately on admission.

On examination, patient was comatose yet opened her eyes, but when questioned could not answer. Pupils were dilated from homatropin. Eye grounds showed some distention of veins but no choking of disc. No apparent paralysis of extremities. No pathological reflexes. There was an extension of the neck and head and difficulty in breathing. Unable to examine pharynx because of difficulty in breathing, but there was quite evidently a pharyngeal and laryngeal paralysis because of her difficulty in swallowing and breathing.

T.P.R. showed slight use for a few days only. It was felt that this condition was essentially organic in nature, probably due to encephalitis involving the bulb.

Throat Examination: To be given by Dr. Lore.

Spinal Fluid: Was clear, not under pressure. Showed 12 lymphocytes and a moderate increase in globulin. Wassermann negative.

Urinalysis: Showed a few casts at times but nothing remarkable otherwise.

Blood Count: Leukocytosis, 14,600 on examination and at one time this went to 18,300 and then later reduced to normal.

Blood Chemistry: Negative. Blood Wassermann negative.

The patient ran a very peculiar course. At time she complained of being drowsy but was easily aroused and responded to commands slowly. No cranial nerve palsies developed other than the ninth and tenth. There was no neck rigidity or Kernig.

On December 13, had a definite weakness of the right upper extremity in arm and forearm, involving the flexors and extensors. Triceps and biceps reflexes somewhat reduced. No pathological reflexes.

On Dec. 16, patient's condition was very much worse. Intense frontal headache and also somewhat occipital. There was some swelling and tenderness over left mastoid region. Unable to hold head up without support. Looked toxic. Suspected brain abscess. This condition cleared up after a few days.

On Jan. 24, however, she became decidedly weaker. It was noticed she had a decided weakness of the right cervical region and muscles of right shoulder, right arm and right forearm so that she was not able to hold her head up nor raise right upper extremity. At intervals after this would become drowsy and fall asleep after being questioned. Tongue deviated to right and pharynx seemed to be less active on that side. Seemed to be anesthetic all over body. Showed peculiar twitching of eyeballs when looking upward. Also twitching of left face and left side of mouth. She was much improved for a week, when she again became drowsy, with marked twitching of the left lower face. No difference in major reflexes. No pathological reflexes.

On Feb. 11, it was noted that she continued drowsy, complained of headache. No twitching noticed. Rather confused. She continued to improve under sodium salicylate gr. 10 given intravenously. Had 20 doses.

On April 6, the condition was noted as being improved, when she became comatose with twitching of left face and mouth. Pulse slow but respiration good. Difficulty in swallowing. Quite drowsy and paid little attention to questions. There was still a weakness of right arm and forearm and weakness of the right trapezius and right sternomastoid muscle with slight atrophy of muscles of right shoulder, arm and forearm.

X-rays showed she had a malposed third molar on the right side, which was extracted. X-ray of skull negative.

After patient was allowed up it was noticed that she had difficulty in walking, due to paresis of right lower extremity, also paralysis of right upper extremity, and there was an exaggeration of the deep reflexes on this side. Also difficulty in walking because patient was unable to hold her head up alone. The head when left to itself would fall directly backward or forward or to either side so special apparatus to support the head had to be provided. No pathological reflexes elicited.

On Nov. 17, 1929, patient was able to walk without support. She dragged the right lower extremity and turned over on the right foot. Other than this, the movements were free in the lower extremity. No atrophy. The movement in the right upper extremity was somewhat weaker than the left. Patient is able to grip fairly well but still has some difficulty in putting her hand on her head. The deep reflexes on the right side were somewhat more exaggerated than on the left. All deep reflexes exaggerated. No pathological reflexes elicited. There was still considerable weakness of the neck muscle on right side and patient is unable to hold up head without support. Some atrophy of muscles of the right side of the neck. Speech and swallowing were entirely normal. No sensory disturbance.

Summary: An acute bulbar syndrome in a female, age 28 years, following puncture of antrum with an acute febrile reaction. Condition characterized by periods of coma lasting about 24 hours, then clearing up. At times picture suggested brain abscess but eventually cleared up, with symptoms of cortical irritation and paralysis of muscles on right side of neck, right upper and lower extremity.

The diagnosis lay essentially between a poliomyelitis and a poliomyelitis. In favor of the former was the slight increase in globulin and the presence of only a small number of lymphocytes. Also in favor of this diagnosis was the peculiar cause and long duration of the disease and the absence of a typical atrophy of the involved muscles. Also the electrical reaction of the muscles never showed an R.D., but a quantitative reduction. Again, the reflexes on the affected side were not abolished and at present are hyperactive. All of the above findings would favor a diagnosis of encephalitis rather than a poliomyelitis.

The Palatal Palpebral Reflex. Dr. Charles J. Imperatori.

This reflex is one that is observed as a normal reaction. The study of its absence, I feel, will be of distinct value to all, particularly so to laryngologists and neurologists. At this time, no attempt is made to give a detailed description of the physiological mechanism of this reflex. The reflex arc is probably through the seventh and fifth cranial nerves. There is also the possibility that part of the arc is through the ninth and remotely through the eleventh. An analysis of the movement of the eyelid shows the closure of the eyelid is very rapid in comparison with the opening. A motion picture film of the reflex shows that the interval between applying the stimulus and the closure of the eyes is one-fourth less time than the gradual opening of them.

DISCUSSION.

DR. MICHAEL OSNATO: I am tremendously interested in Dr. Imperatori's presentation, from several points of view. First of all, I want to pay my respects to the keen observations made by Dr. Imperatori. So far as I know, this reflex is unknown to neurologists. That does not mean that it has not been described before possibly, but I do not know about it. It is of value aside from its purely academic interest; since Dr. Imperatori has demonstrated this reflex to me, I have been able to prove its clinical value. Just the other day, in a case of hysterical aphonia with anesthesia of the palate and loss of the pharyngeal reflex, the palatopalpebral reflex was absent. On the afferent side of the arc, any condition which would make for anesthesia in the distribution of the fifth cranial nerve would make, of course, for loss of this reflex. On the efferent side of the arc, anything which would affect the distribution of the innervation of the seventh cranial nerve would make it impossible for the orbicularis oculi to function, thus preventing the blinking of the eyes. I think this will turn out to be an important thing, not only for the laryngologists, but particularly for neurological observers. A great deal of work will have to be done in checking it against clinical experience, but that it has a value above a purely academic one I am sure.

DR. SIMON L. RUSKIN: I am delighted to hear this particular presentation of Dr. Imperatori. I have done work on the nerve supply in that particular zone. It is interesting to note that there is a distinct relationship between the innervation of the muscles around the eye with the nerves which supply the palate, the roof of the mouth, and the side of the mouth. You are actually

striking the middle and posterior palatine nerves. They come from the sphenopalatine ganglion, and have a distinct connection with the supply of the facial nerves. It is interesting to note that the orbicularis oculi, the supraciliary muscles which work the eyebrows, and the frontalis muscles are all distinctly influenced by the sphenopalatine ganglion by way of the greater superficial petrosal nerve, one of the roots of the sphenopalatine ganglion. Along with this greater superficial petrosal run these fibres which go through the ganglion, through the middle and posterior palatine nerves, to the palate which we are striking. It is a relatively frequent occurrence to find disturbances along that course. I have also described in the literature the so-called ocular headache and narrowing of the palpebral fissure due to the overaction of the orbicularis oculi, the corrugator supercili and frontalis muscles resulting from irritation of the sphenopalatine ganglion so that when you strike the middle and posterior palatine nerves you can directly affect the facial system and produce a reaction influencing the three muscles surrounding the eye. I think further work along that line might show an interesting reflex that can be used for the differentiation of disease processes.

DR. CHARLES W. BUVINGER: Regarding this palatal reflex, it might be well to mention Alexander's reflex, which is a palpebral aural reflex. In Alexander's Clinic they think a great deal of it. It is used in testing children, where you cannot be sure if they hear or not. Alexander takes a tuning fork, C⁴, puts it behind the child so that he cannot see it, and if they hear when it is struck they give this same palpebral reflex. Some claim it is a defense reaction. If the fifth, seventh and eighth give this reflex, it is something to think about. The palpebral reflex may be connected with more cranial nerves we have not tried out.

DR. IMPERATORI (closing the discussion): The patient presented by Dr. Leahy, who had the paralysis of the soft palate, did not give this reflex. I simply presented these observations for discussion, and hope to study it further.

Nerve Block. Dr. Louis Gaston Labat.

(To appear in a subsequent issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. J. E. MACKENTY: I regret that circumstances prevent my being present to hear the paper on local anesthesia by so distinguished an authority on that subject as Dr. Labat. I wish to thank Dr. Labat for this effort in behalf of our Society, every member of which, I am sure, is thoroughly familiar with his unique treatise on "Regional Anesthesia." Personally, I have derived great help from its sharpening effect on my own technique.

The results obtained in regional anesthesia are in proportion to the skill in its use. But even with the greatest skill it is sometimes necessary to resort to ether or gas oxygen anesthesia as an adjunct—the advantage being that the local anesthetic diminishes the amount and the period of the general anesthetic. In neck surgery, and especially in laryngeal surgery, I have found this combination ideal. In this field the operative time is often prolonged to a point where local anesthesia alone puts a serious mental strain on the patient and where general anesthesia alone is prohibitive. If the patient is aware that, at any time during the operative period, he may elect to be put to sleep, his morale is greatly fortified for the ordeal. My practice is to switch to general anesthesia after the first hour or less. Twenty or 30 minutes of light general anesthesia is then given. The somnolent condition of the patient allows the operation to be concluded with what remains of the local anesthesia without pain and without anxiety.

In acute sepsis, in advanced metabolic imbalance, such as diabetes, in pulmonary tuberculosis, in chronic pulmonitis and in many other conditions in which general anesthesia is perilous, local anesthesia is indispensable. Here, it may, with great advantage, be combined with gas oxygen, if need be.

It is my hope that the time may come when cocaine, as an anesthetic in our field, will be eliminated. It is still in extensive use in intranasal surgery and, so far as my experience goes, nothing in this region can equal it in efficiency. But its dangers are great. It produces many more deaths than are reported, to

say nothing of the near deaths and of the agonizing anxiety on the part of the surgeon. So fearful am I of this marvelous but treacherous drug that for several years I have used general anesthesia as first choice in all intranasal procedures; and when forced to use cocaine, every safeguard known in the art of its use is employed to forestall trouble.

Local anesthesia, no matter how skillful its use may become, can never supplant general anesthesia. But if we were all as experienced in its use as Dr. Labat must be, many patients could be saved the inconvenience and danger of the older method. In minor surgery it is all-sufficient. In major surgery it is a marvelous adjunct to our armamentum, making possible extensive operative procedures without the anesthetic shock, so common in the old days. It is another rung in the ladder leading to the perfection in surgery which seems so remote and so desirable and towards which we are all so earnestly striving.

DR. I. W. VOORHEES: It is a pleasure to sit at the feet of a teacher like Dr. Labat and I am grateful to him for the graphic description of his methods of securing local anesthesia in the head and neck.

My own experience has been largely in doing local sinus work, and I have used local anesthesia in all of the major procedures, but chiefly in doing the Caldwell-Luc. Novocain 1 per cent is injected along the line of incision, then into the infraorbital region, with the index finger of the left hand against the cheek so that one knows exactly where the point of the needle is at all times. One need not inject the nerve trunk as paraneural infiltration is entirely sufficient. The next point of introduction is along the course of the posterior superior dental nerve, upward and backward. Finally, I inject the posterior palatine area at a spot about 1 c.m. above and medial to the last molar, and, last of all, the anterior palatine area in the region of Stenson's and Scarpa's foramina. Pledgets of 10 per cent cocaine solution are placed in the middle turbinal and inferior turbinal fossae in order to make sure of sufficient anesthesia of the nasal wall of the antrum. About five drops of adrenalin to the ounce of novocain is always added when getting the solution ready, and 10 drops of adrenalin to each pledget of cotton. One can then begin to operate without waiting. If the inner wall is sensitive after getting into the antrum, a small piece of cotton in a hemostat is dipped in 10 per cent novocain, and the mucous membrane is thoroughly swabbed with it, but no excess should be allowed to drip into the pharynx. No postnasal plug is needed, as the bleeding is negligible. A local Caldwell is just as easy to do as a submucous and much more satisfactory to all concerned. I would like to see it widely used by all rhinologists.

DR. JAMES J. KING: *Mr. Chairman and Gentlemen:* I have enjoyed and profited tremendously from Dr. Labat's discourse on block anesthesia. His masterly presentation needs no discussion except to congratulate him upon his skill and success.

The Chairman has asked me to discuss the general preparation of the patients and preliminary medication. I shall therefore confine my remarks to these topics, which often mean so much to the success of the block or local anesthesia.

General Preparation and Technique: It is desirable that all operations of any importance should be carried out in a well organized hospital. The general preparation of the patient for local anesthesia is practically the same as for general anesthesia. If all organs are properly performing their functions, no special preparation is necessary. A clean, pink tongue is desirable, and if this condition is present, no other preparation is needed. The patient is sent to the hospital with the assurance that the operation will be carried out without pain or great disturbance. Every condition around the patient should be conducive to allaying his fears and establishing confidence in the complete success of the anesthetic. An intelligent nurse can do much to secure the patient's confidence, allay his fear and help carry out the program. A sedative should be given as preliminary medication before the operation. The author giving morphia, magnesium sulphate and novocain hypodermically, according to the principles outlined in synergistic anesthesia. The patient should then relax and be kept quiet. He should be carried to the operating room on a stretcher; if exercise is permitted after a sedative, the effect is exactly opposite, and excitement

instead of relaxation is produced. All patients should be operated upon in the recumbent or semirecumbent position. There should be no unnecessary noise or excitement in the operating room; everything and everybody there should be quiet, and from such an atmosphere the patient will be inspired with confidence.

Details for the Comfort of the Patient: Pain sensibility undoubtedly varies with different individuals. It varies with age, culture, intelligence and philosophy of life. The intelligent are better subjects for local anesthesia than the ignorant, and will co-operate understandingly with the surgeon. City people stand operations under local anesthesia better than do country people. Old people, who with advanced years have developed a sound philosophical view of life, are better subjects for local anesthesia than the young. The phlegmatic type stands local anesthesia better than the highly nervous, sensitive type. This may account for the great success of local anesthesia in Germany. There should be a cheerful, confident atmosphere around the patient before going to the operating room and during the operation. The patient is placed upon the operating table, which has been covered with a light, soft mattress and a rubber sheet. Under the spine a triangular pad should be placed; this pad will add greatly to the comfort of the patient and prevent much backache which has been complained of after operating. The feet should be well supported by a sand bag at the foot of the table. The surgeon should be deliberate in all his movements and not display any nervousness which will make for lost motion. The tissues must be handled with gentleness; with the exercise of such care, local trauma is slight and convalescence is more rapid and comfortable.

Preliminary Medication: I have found great satisfaction in the use of chlorotone. It may be given by mouth in 10 or 15 gr. doses one hour before operation. It may also be given as a 15 gr. suppository. It quiets the patient and, altogether, is very beneficial both during the operation and immediately afterwards, by inducing quiet, restful sleep.

I have used scopolamin hydrochlorid gr. 1/150 by mouth or by hypodermic one-half hour before operation with no untoward effects. I have also used morphin gr. $\frac{1}{4}$ - $\frac{1}{2}$ alone or with 2 per cent novocain and 50 per cent magnesium sulphate solution. This m-n-m sulphate solution can be obtained in ampoules ready for injection. The injection should be given intramuscularly into the buttocks, after painting the skin with iodine. Unless this solution is given intramuscularly it is apt to cause irritation and a slough which will very likely become infected. For a patient weighing 150 pounds, in average condition of health, two such injections may be given. The first should be given 1½ hours before operation and followed by the second one-half hour later. I have performed upwards of 100 operations on selected patients with no other anesthetic than these injections. I, however, do not advocate relying upon them alone unless there is some real contraindication in the use of both local and general anesthesia. Morphine produces disagreeable nausea and vomiting in a large number of patients.

Sodium Amytol: The latest sedative I have used is sodium amytol. It is chemically Iso-amyl-ethyl Barbituric acid. It is an antidote to cocaine and can be used very satisfactorily before local anesthesia. It can be given by mouth, by rectum or intravenously. In all events it is very rapidly absorbed into the circulation and is capable of producing very profound effects upon it. It is put out by Eli Lilly & Co. It has been used somewhat at Mayo's Clinic with satisfactory results.

It acts first as a hypnotic, then analgesic, and finally as an anesthetic. It is said to have no effect on circulation but I cannot subscribe to this as I find its action very similar to that of morphine as a depressant in toxic dose. It kills by respiratory paralysis. The toxic dose is about 2¼ times the therapeutic dose.

I have used it by mouth in 3 gr. capsules. I suggest that not more than one or two capsules be given to a patient until we have further experience with it. Give one capsule one hour before operation and, if necessary, give the second one one-half hour before operation.

DR. E. M. JOSEPHSON noted the fact that Dr. Labat preferred the lateral injections in paravertebral anesthesia of the cervical region for major laryngeal surgery. He pointed out the serious danger of injury of vital structures, the carotid, the jugular and the vagus nerve, and others, in the use of this method, where anomalies were present. He had had the privilege of assisting Dr. Soerensen, of Berlin, of the famous team of Gluck and Soerensen, who devised several of the major surgical operations on the neck, including total and hemilaryngectomy. They did as large a volume of such operative work as any surgeon, often doing two laryngectomies in a day. They preferred the posterior route for paravertebral anesthesia, inserting the needle down to and past the tip of the lateral process of the vertebra. Their anesthesia was usually all that could be desired, and with local cocainization of the larynx after its severance, as well as before the operation, was almost always entirely adequate. Dr. Josephson asked Dr. Labat if he was of the opinion that the lateral method of injection offered any advantages which overbalanced the added risks of the lateral method.

DR. SIMON L. RUSKIN: I wish to say a few words about the injection of the sphenopalatine ganglion. In this connection it would be interesting to observe the experimental work done by Campbell at the University of Pennsylvania. They injected with methylene blue the sphenopalatine ganglion by all the routes in current use, the lateral route, the posterior, Sluder's method, and the palatomaxillary canal route which I have introduced. They found the latter was the most direct route and the one of choice.

As far as hemorrhages are concerned, Sluder's method gives more, because it injures the mucosa, and in injecting, the arteries slightly anterior to the ganglion may be injured. If you inject the sphenopalatine ganglion through the palatomaxillary route and you strike a vessel, you hit it at 3 to 4 c.m., so that you have local hemostasis. In a relatively large number of injections I have never had a hemorrhage. Sluder himself has said that the method was very much superior as far as accessibility and accuracy.

DR. LOUIS GASTON LABAT (closing the discussion): Judging from Dr. Ruskin's discussion, one would think that I spoke of postoperative hemorrhage in every case. I referred to only those cases in which intranasal injections of the ganglion had been made. When injecting the ganglion through the posterior palatine canal or into the sphenomaxillary fossa there is no hemorrhage. I quite agree that the posterior palatine foramen is one of the ideal routes for the injection of the sphenopalatine ganglion, but I also insist that the ganglion can be injected by the lateral route, and with the same success as when the injection is made through the posterior palatine canal.

Dr. Klepper is quite right in asking what is the reason for injecting the sphenopalatine ganglion, since it does not contain any sensory nerves, and is simply sympathetic. I have found that each time I injected the maxillary nerve—I have injected it three times today—I have always had anesthesia of the palate, which means that the injection of the maxillary nerve in the sphenomaxillary fossa involves anesthesia of all its branches, whatever they may be, whether they pass through the ganglion or not. The question is, whether the ganglion can be injected from the lateral aspect or from below. I think both routes are correct.

As regards the cervical plexus block by the posterior route, since it is possible to obtain satisfactory results in hundreds of cases by the posterior route, there is no reason to doubt the efficiency of such a procedure. I have tried both of these many times, and many years ago I found the posterior route to be less successful than the lateral. By the lateral direct route the nerves are so superficial and the landmarks so accurate that it becomes easier to inject them by this route than to pass the needle through the posterior region of the neck. This region is a mass of tissues consisting of muscles whose directions intercross. When the needle is passed through the fascia, which is very sensitive, the patient may move one muscle and keep another muscle quiet, so that the needle is stuck in such a position as renders it difficult for the needle to advance deeper and deeper until it touches the lateral masses. From the lateral masses the needle must be passed sideways to reach the transverse processes, otherwise there would be anesthesia only of the posterior primary

divisions. I find the lateral route much better; I find it easier, and I find it as safe as the posterior route; but the needle must not go beyond the tip of the transverse processes. If the injections are made in the front of the transverse processes or in front of the bodies of the vertebrae, the carotid sheath might be compressed; the carotid artery, the internal jugular vein as well as the vagus might be kinked, thus interfering with the circulation of the brain, part of the innervation of the heart and that of the larynx. The edema caused by the injection made in front of the bodies of the vertebrae would reflect on the larynx and pharynx, as well as on the esophagus and cause disturbances in deglutition and respiration. This may result in great distress. It is therefore urged to be very careful in making these injections.

Neurology in Its Relation to Rhinology. Dr. Israel Strauss.

(To appear in a subsequent issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. MICHAEL OSNATO: I think a bit of duplicity of Machiavellian type has been sprung on you by your Secretary. Mine is not really a discussion of Dr. Strauss' talk, but is a discussion of the relationship of the laryngologist to neurology, or rather, of neurology to laryngology. Rather than put down another paper on the program, which might have discouraged you and kept you away, Dr. Loré put me down for a discussion of Dr. Strauss' paper; but asked me specifically to give the pathological anatomy of laryngological conditions.

Of these, the most frequent are the infections which have their locus in the medulla, and of these the polioencephalitic type of epidemic encephalitis is of greatest interest now. For example, the two cases shown by Dr. Leahy and Dr. Loré. The next in point of frequency are the poliomyelitic cases, and then the polioencephalitic types of paralysis which one encounters in diphtheritic and other infections of the central nervous system. Also here belong the cases of tubercular lesions with bulbar symptoms. The vascular lesions affecting the bulb come next in frequency, and these may be due to hemorrhage, embolus or thrombus. Arteriosclerosis, atheroma and endarteritis are the pathological lesions encountered here,—endarteritis nearly always of luetic origin; and then tumors, neoplastic situations, infectious growths, gumma and tubercle perhaps being more frequent than any others. Of the vascular lesions of the medulla a great many have been classified in a perfectly definite way, and I want first to give you a little of the physiology and anatomy which will help you to understand these lesions. These have been classified in the form of syndromes. The first is the syndrome of Schmidt, unilateral paralysis of the vocal cord, palato- and laryngoplegia and paralysis of the trapezius and sternocleidomastoid on the side of the lesion. The next is the syndrome of Jackson or Tapia, unilateral paralysis of the larynx, velum palati, and tongue. Then there is the syndrome of Avellis in its pure form without the association of Horner's syndrome, and then the syndrome of the posteroinferior cerebellar artery. In all these syndromes there is a paralysis of the palate, and a paralysis of the larynx in addition to certain other neurological signs, and perhaps I may fix them in your mind if I use a slide for demonstration. It becomes necessary to orientate oneself a little as to the anatomy of the bulb. This section is through the mid-olive level of the medulla. This is the nucleus of the column of Burdach, the second series of neurones which eventually go into the median fillet to the cortex. In this are carried all the types of sensation, except pain and temperature and perhaps gross touch. Pain and temperature and touch pressure are situated here in this tract, known as the spinothalamic. In this preparation the cell groups cannot be identified, as they could in a hematoxylin-eosin or a nasal preparation. One can only identify them in a preparation like this by indicating their position in a general way. The spinothalamic tract carries pain and temperature. This is also known as the spinal fillet. This is the restiform body, which with other elements goes to make up the inferior cerebellar peduncle. Here is the descending spinal fifth; the fifth cranial nerve has a descending element, which goes down to the first cervical segment of the cord, and it represents sensation in the upper part of the face, chiefly the ophthalmic division of the fifth nerve. In this region is the fasciculus solitarius, which has

in it the elements of the ninth, tenth and eleventh cranial nerves, that have to do with sensation in the posterior part of the tongue. One must recall that the vagus is really a complex of the ninth, tenth and the medullary portion of the eleventh, which go to make up the vagus, and only peripherally are they three separate nerves. Here is the dorsal sensory root of the ninth and the nersal root of the tenth. This particular group of fibres is the rubrospinal tract. In this region is the nucleus ambiguus, which is the motor nucleus of the vagus, and is the site for the cells innervating the larynx. It is seen perhaps better here, and apparently running into this nucleus ambiguus is the accessory tract of the fifth, and it may be of some interest in relation to Dr. Imperatori's very interesting, and apparently original contribution.

Dr. Ruskin's explanation may be the answer to Dr. Imperatori's reflex. It may be possible that the reflex is a tendon reflex, however, in view of what Dr. Imperatori said about checking it and if that is so the pathways are unknown. There is no certainty as to whether the seventh or fifth cranial nerve carries muscle tendon sensitivity. It is possible that in the literature pathways have been established by means of which the accessory fifth arc has been found to have a relationship to the ambiguus, and that again may be the pathway for this reflex of Dr. Imperatori.

This syndrome of Schmidt is explained by a very discrete lesion at a level lower than this mid-olivary level, compromising the nucleus ambiguus, and the medullary nucleus of the spinal accessory nerve. In such a condition the patient will show a paralysis of the sternocleidomastoid muscle and of the trapezius, the occiput tilting toward the side of the lesion, the chin pointing away from the side of the lesion, and a paralysis of the palate and of the vocal cords, and nothing else. The second lesion, the syndrome of Jackson or Tapia, will occur at the level of the twelfth nerve nucleus and includes all three, not only the nucleus ambiguus and the accessory nucleus, but also extending to the twelfth nerve nucleus, so that if you will imagine a lesion (and these things are not theoretical, but have been described many times) involving this portion of the medulla, it will give you in addition to paralysis of the vocal cord and the sternocleidomastoid and trapezius paralysis, also a paralysis of the tongue. The syndrome of Avellis, which in my experience is perhaps more common than any of these, the pure syndrome, is explained by extension outward toward the periphery, involving the spinothelmic tract, and in that case one would have an ipsilateral paralysis of the vocal cord, and on the opposite side disturbance only of pain and temperature, and the hurt sensation. When this syndrome is not found in its pure form, there is the associated Horner syndrome; dorsal to the nucleus ambiguus is the nucleus known as the nucleus of Bugge, which is the pupillary nucleus, and when that is involved one has the Horner syndrome, which may occur also from involvement of the first dorsal and eighth cervical root in brachial plexus injuries or in injuries to the cord from the second to the fourth dorsal level. Horner's syndrome consists of a myosis, small pupil with a mild ptosis of the lid, and an enophthalmos. Then finally in the experience of some more frequently than of any other syndrome is found the syndrome of the periphery of the medulla, the syndrome of the posterior inferior cerebellar artery. This results in a facial anesthesia, particularly in the ophthalmic distribution of the fifth cranial, unilateral cord paralysis, ataxia and asynergia, all on the side of the lesion, and a contralateral disturbance only of pain and temperature not entering the face.

Probably, however, these lesions are of very much less interest to you from the neurological standpoint than are the functional aphonias and dysphonias. Unless the laryngologist is trained in psychotherapy, I think that regardless of the fact that these cases can very often be cleared up so far as the symptom itself is concerned rather promptly by almost anything in the way of instrumentation, we ought to recognize the fact that the psychoneurotic patient who recovers from the aphonia or the dysphonia is not helped simply by relieving him of these symptoms, but that there are underlying factors in the emotional life of that individual which should be very carefully gone over, and I would recommend, not as propaganda, but in fairness to your patient, that you be not satisfied with simply curing the aphonia or dysphonia, but that you refer such patients to properly trained, competent psychotherapists.

